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The symphytognathoid spiders of the Gaoligongshan, Yunnan, China (Araneae, Araneoidea): Systematics and diversity of micro-orbweavers

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Abstract

A ten-year inventory of the Gaoligongshan in western Yunnan Province, China, yielded more than 1000 adult spider specimens belonging to the symphytognathoid families Theridiosomatidae, Mysmenidae, Anapidae, and Symphytognathidae. These specimens belong to 36 species, all herein described as new. In Theridiosomatidae: *Epeirotypus dalong* **sp. n.**, *Ogulnius barbandrewsi* **sp. n.**, *Baalzebub nemesis* **sp. n.**, *Theridiosoma diwang* **sp. n.**, *Theridiosoma shuangbi* **sp. n.**, *Zoma dibaiyin* **sp. n.**, *Wendilgarda muji* **sp. n.**, *Coddingtonia euryopoides* **gen. n., sp. n.**; in Mysmenidae: *Mysmena changouzi* **sp. n.**, *Mysmena jinlong* **sp. n.**, *Mysmena bizi* **sp. n.**, *Mysmena goudao* **sp. n.**, *Mysmena haban* **sp. n.**, *Mysmena shibali* **sp. n.**, *Simaoa yaojia* **gen. n., sp. n.**, *Simaoa kavanaugh* **sp. n.**, *Simaoa maku* **sp. n.**, *Simaoa bianjing* **sp. n.**, *Gaoligonga changya* **gen. n., sp. n.**, *Gaoligonga zhusun* **sp. n.**, *Mosu nujiang* **gen. n. sp. n.**, *Mosu huogou* **sp. n.**, *Chanea suukyii* **gen. n., sp. n.**, *Maymena paquini* **sp. n.**, *Maymena kehen* **sp. n.**; in Anapidae: *Gaiziapis zhizhuba* **gen. n., sp. n.**; in Symphytognathidae: *Patu jidanweishi* **sp. n.**, *Patu qiqi* **sp. n.**, *Patu xiaoxiao* **sp. n.**, *Crassignatha pianma* **sp. n.**, *Crassignatha yinzhi* **sp. n.**, *Crassignatha quanqu* **sp. n.**, *Crassignatha yamu* **sp. n.**, *Crassignatha ertou* **sp. n.**, *Crassignatha gudu* **sp. n.**, *Crassignatha longtou* **sp. n.** The first species of *Zoma* Saaristo, 1996 (previously monotypic, known from Seychelles) and *Maymena* Gertsch, 1960

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(previously known from the Americas) are reported from China. The genus *Crassignatha* Wunderlich, 1995 (previously known from a single male from Malaysia) is represented by seven new Chinese species and is transferred to Symphytognathidae. The first *Epeirotypus* O. Pickard-Cambridge, 1894 species from beyond the Neotropics is described, although the presence of the genus in Asia was previously noted. Notes on morphological characters exhibited by this fauna and implications for the limits and diagnosis of some symphytognathoid families are given. Dichotomous keys to species are provided. Quantitative biodiversity analysis suggests a high degree of endemism for symphytognathoids in the Gaoligongshan.

Keywords

Theridiosomatidae, Mysmenidae, Symphytognathidae, Anapidae, biodiversity, endemism, labral spur

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Top: puffs of cornstarch reveal dense and varied tiny cryptic webs in the Gaoligongshan. Shown here upper left to lower right are a symphytognathid *Patu jidanweishi* sp. n., a mysmenid *Gaoligonga changya* gen. n., sp. n., and an unidentified linyphiid. Bottom: this misty mountain landscape at QiQi is typical of the Gaoligongshan

Introduction

Symphytognathoid spiders are tiny (mostly ca. 1 mm total length), cryptic araneoid spiders. While typically rare in collections, they can be very abundant as revealed by litter extraction or dusting appropriate microhabitats with corn starch to elucidate fine webs (Griswold and Yan 2003: figs 24D, 25D, Ramírez et al. 2004; see page 12).

Forster (1959) revised and greatly expanded the circumscription of Symphytognathidae to accommodate minute spiders with a tendency toward reduction in the respiratory system, eye number, and the female pedipalp. His Symphytognathidae, which includes the contemporary lineages Anapidae, Mysmenidae, and Micropholcommatidae (including Textricellidae), was criticized for being based on reductive characters that might reflect a decrease in size more than shared phylogenetic history resulting in a "polyphyletic dump heap of minute Araneoidea" (Lehtinen 1975). Symphytognathidae, Anapidae, and Mysmenidae were consequently relimited and diagnosed on positive characters (e.g., fusion of the chelicerae in Symphytognathidae, Forster and Platnick 1977; the presence of a labral spur in Anapidae, Platnick and Shadab 1978a; clasping spur, cymbium with distal lobes, femur with distoventral sclerotized spot in Mysmenidae, Platnick and Shadab 1978b). Microphолcommatidae and Textricellidae were transferred from Araneoidea to Palpimanoidea (Forster and Platnick 1984) based on characters of the chelicerae. Microphолcommatidae and Textricellidae were synonymized later (Platnick and Forster 1986). After much effort to reform symphytognathoid lineages based on explicit synapomorphies, it is ironic that a phylogenetic study by Schütt (2003) concluded that Forster's (1959) much criticized broad concept of Symphytognathidae (including the Synaphridae, removed from Mysmenidae by Marusik and Lehtinen 2003) was supported as monophyletic. A phylogenetic analysis by Griswold et al. (1998) placed Theridiosomatidae sister to the clade including Mysmenidae, Symphytognathidae and Anapidae, and theridiosomatids have been subsequently referred to as symphytognathoids.

Not all authors follow this nomenclature. Notably, Wunderlich (2004) refers to Forster's (1959) Symphytognathidae as Anapidae, composed of several subfamilies comparable to the various families discussed above.

The arachnology unit at the California Academy of Sciences has participated in a 10 year inventory of the Gaoligongshan (or Gaoligong mountains) in western Yunnan Province, China. This international effort involved collectors from Hunan Normal University and elsewhere. From the outset, symphytognathoids were a focus of the California Academy collecting effort. In a separate paper, egg guarding behavior was reported for a species of *Patu* (Griswold and Yan 2003), described here as *P. jidanweishi* sp. n. The web architecture of several species was photodocumented. Ultimately, 1097 adult symphytognathoid specimens were collected belonging to four families: Theridiosomatidae, Mysmenidae, Anapidae, and Symphytognathidae. These specimens were sorted into 36 species, all new to science and described herein. Species

were allocated among 16 genera including six proposed here as new (four in Mysmenidae, one each in Theridiosomatidae and Anapidae).

Methods

The systematic portion accounts for every adult spider from the micro-orbweaver clade (Symphytognathoidea, see below) collected between 1998 and 2007 on expeditions to the Gaoligongshan, Yunnan Province, China involving the California Academy of Sciences and collaborators.

All measurements are in millimeters and were taken using a reticule in a Leica MZ12.5 dissecting microscope. Subjects for illustration were cleared in methyl salicylate (Holm 1979), slide mounted (Coddington 1983), and illustrated using a Leica DM4000 M compound microscope fitted with a drawing tube. Illustrations were rendered in Adobe Photoshop (version 6.0). Anatomical photographs were taken using a Nikon DXM 1200 digital camera mounted on either a Leica MZ16 dissecting microscope or a Leica DM4000 M compound microscope. A combination of white sand and photographic manipulation was used to remove the background from photos taken through the MZ16. Web photographs were collected over the course of the inventory, mostly by CG.

SEM images were taken using the Leo 1450VP at the California Academy of Sciences. Specimens for SEM examination were critical point dried and sputter coated with gold-palladium. Specimens were mounted on copper tape using white glue.

SEM images and illustrations of the male genitalia were either made from the left palp or reversed so they appear to depict the left palp.

All holotype specimens are deposited at Hunan Normal University; the remaining specimens were split between the California Academy of Sciences and Hunan Normal University. This is in accordance with conditions agreed to at the beginning of the study and stipulated in our collecting permits.

Chaetotaxy. Macrosetae are reported for the dorsal (d), prolateral (p), retrolateral (r), and ventral (v) surfaces of the legs. Metatarsal trichobothrium position is expressed as the ratio of the distance between the proximal margin of the metatarsus and the root of the trichobothrium divided by the total length of the metatarsus (Denis 1949, Locket and Millidge 1953) and expressed as TmI (position of trichobothrium on metatarsus I), TmII (position of trichobothrium on metatarsus II), or TmIII (position of trichobothrium on metatarsus III). The position of the tarsal organ is similarly expressed as the distance from the proximal margin of the tarsus and the tarsal organ divided by the total length of the tarsus.

Etymology. Several new taxonomic names proposed here are derived from Chinese words. Both the pinyin Romanized spelling and the simplified Chinese characters are given. For nomenclatural purposes, epithets formed in this way should be considered arbitrary combinations of letters and grammatically immutable.

Abbreviations and Conventions. Abbreviations used in the text and figures are given in Table 1. References to figures published elsewhere are listed in lowercase type (fig.); references to figures in this paper are listed with an initial capital (Fig.).

When multiple consecutive records in the material examined section were from the same locality, data after the first record are given in brackets as [same locality] or [same data] if the locality, date, and collector are all identical; records of specimens from the same collecting event as the holotype are indicated in brackets as [same data as holotype].

Online Taxonomy. Full color versions of all images included in this publication have been deposited in MorphBank (http://www.morphbank.net). ZooKeys already contributes text and data elements (but not images) to the Encyclopedia of Life, and we anticipate that EOL will incorporate the MorphBank images into the encyclopedia pages. New taxonomic names proposed in this paper have been registered with ZooBank (http://www.zoobank.org/) as part of the ZooKeys publication process (given as LSID numbers following each new name). Collection data has been shared (via Appendix B) with the Global Biodiversity Information Facility (GBIF, http://www.gbif.org/). A kml file for viewing distribution records interactively in Google Earth (http://earth.google.com/) is available for download as Appendix C. Our intention is that the paper edition of this work be rarely used by taxonomists (as long as internet access is available). Instead, it will be possible to browse image collections in MorphBank or EOL species pages turning to the open access pdf when more details are required.

Biodiversity. Species richness estimation curves were created over 100 randomized runs using EstimateS (Colwell 2005). Distribution records were plotted in the Geographic Information System software package ArcGIS (version 9.2). To facilitate richness estimation using incidence based statistics, a 1 km square grid was superimposed over the study area. Records were assigned to samples based on which square they fell in; squares without any collections were ignored.

Table 1. List of anatomical abbreviations used in the text and figures.

Male palp:	
B	base of cymbium
BH	basal hematodocha
BK	basal keel of cymbium
C	conductor
CB	cymbium
CT	cymbial tooth
DL	distal lobe of cymbium
E	embolus
EA	embolic apophysis
EM	embolic membrane
G	cymbial groove

Male palp:	
MA	median apophysis
MK	median keel
PA	patella
PAA	patella apophysis
PC	paracymbium
ST	subtegulum
T	tegulum
TI	tibia
Vulva:	
AL	anterior lobe of epigynum
BL	basal lobe of scape
CD	copulatory duct
DL	distal lobe of scape
FD	fertilization duct
PL	posterior lobe of epigynum
S	spermatheca
Spinnerets and somatic morphology:	
AC	aciniform gland spigot
AG	aggregate gland spigot
AGn	aggregate gland spigot nubbin
ALS	anterior lateral spinneret
BC	booklung cover
CY	cylindrical gland spigot
FL	flagelliform gland spigot
FLn	flagelliform gland spigot nubbin
MAP	major ampullate gland spigot
mAP	minor ampullate gland spigot
n	nubbin
PI	piriform gland spigot
PLS	posterior lateral spinneret
PMS	posterior median spinneret
t	tartipore
Institutions:	
CAS	California Academy of Sciences
HNU	Hunan Normal University

Diversity and endemism

The Gaoligongshan region is located in the heart of one of the world's biodiversity "hotspots" (Myers 1988, 1990, Mittermeier et al. 1998, Myers et al. 2000). "Hotspots" are areas of extreme biodiversity and endemism under severe threat of habitat destruction. But the hotspot designation itself, while an extremely successful concept for the conservation community, has been criticized for over-reliance on data from vascular plants and tetrapod vertebrates (Kareiva and Marvier 2003). The hotspot designation criteria were originally selected in part because these taxa are relatively well known and well sampled worldwide, but it is not clear that they are representative of the biota as a whole because sampling and knowledge about the most diverse groups on Earth tends to be incomplete (Lawton et al. 1998, Reid 1998, Van Jaarsveld et al. 1998). Here we present data on the biodiversity of a cryptic arthropod clade in a hotspot region.

Non-parametric point diversity estimators are driven by rare species. The more a study is dominated by rare species, the more species are presumed to have been missed altogether. Two different classes of biodiversity estimators were used: abundance based and incidence based. Abundance based methods are driven by the total number of specimens in the collection, regardless of when or where they were collected. For incidence based estimators, rarity is determined by the number of samples a species occurs in, regardless of the actual number of specimens. Sampling was not structured by design, so the study area was divided *a posteriori* into 1km square plots. Specimens from the same plot were assigned to the same sample.

Abundance and incidence based estimators indicate very different signals (Fig. 1A). Abundance based estimators suggest that about 5-10 species were missed by the inventory; incidence based estimators suggest it is closer to 30. The conflict can be resolved if we understand how the two estimator classes work. The incidence based estimators (Chao 2, Chao 1987; ICE, incidence-based coverage estimator, Chazdon et al. 1998; Jackknife 2, second order jackknife, Burnham and Overton 1978, 1979) are high because few plots share species. The abundance based estimators (Chao 1, Chao, 1984; ACE, abundance based coverage estimator, Chazdon et al. 1998) are low because most species are represented overall by more than a few specimens. Thus, sampling was reasonably thorough where it occurred, but the degree of endemism is high relative to the density of sampling sites. So we can conclude that many symphytognathoid species remain to be discovered in the Gaoligongshan, mostly from sites not visited during this study. Given the magnitude of human impact, especially at lower elevations, and the apparent high endemismicity in many of the species treated here, it may be that some of the unobserved species predicted are already extinct.

Chao et al. (2005) have proposed a correction to the classic Sørensen (1948) index of community similarity. The Chao modification factors in estimated unobserved species shared between two communities. As with other such estimators, the correction is driven by rare species in one or both communities. The Gaoligongshan survey

did not follow a strictly regimented collecting protocol, but it did concentrate effort in four "core areas" (Fig.1B) more or less evenly spaced (roughly 60-130 km apart) along the North-South running mountain range. Considering only symphytognathoids collected in these core areas (Table 2), we performed pairwise Chao-Sørensen analyses to assess beta diversity (change in community over space). Of the 1097 symphytognathoid specimens collected overall, 1013 were from core areas. The two northernmost sites (Heipu and Shibali) are most similar (0.71). The southern sites Fengxue and Nankang are each quite distinct from any of the other site. Symphytognathoids may prove to be a useful clade for fine grained spatial analysis of tropical biodiversity, especially in tropical and subtropical regions.

Systematics

Araneoidea. This superfamiliar taxon comprises ecribellate orb web builders and their kin with modified orbs. This taxon was defined in the cladistic analysis of Griswold et al. (1998) by the following unambiguous synapomorphies: the paracymbium on the male palp (character 7), juxtaposed lateral eyes (character 30), a labium that is wider than long (character 41), serrate setae (character 51), loss of the cribellum (character 66), an mAP spigot nubbin on the PMS (character 71), PMS mAP spigot in a posterior position (character 72), flagelliform gland and aggregate gland spigots (the "araneoid triplet") on the PLS (characters 77 and 78), and squamate cuticle (character 79). Included were the families Anapidae, Araneidae, Cyatholipidae, Linyphiidae, Mysmenidae, Nesticidae, Pimoidae, Symphytognathidae, Synotaxidae, Tetragnathidae, Theridiidae, and Theridiosomatidae. Whereas inclusion of these families in the Araneoidea has been unproblematic, the relationships to and placement of Palpimanoidea (sensu Forster and Platnick 1984) and Araneoidea have generated controversy, particularly with regard to the entelegyne families Mimetidae and Pararchaeidae. Schütt (2000, 2003) suggested that Mimetidae, Pararchaeidae, Micropholcommatidae (as a synonym of Anapidae) and Malkaridae belong with the Araneoidea. Griswold et al. (2005), in a quantitative analysis extending across Araneomorph taxa but including only a few araneoids and palpimanoids, found corroboration for Schütt's thesis that at least some "palpimanoids" nest within the Orbiculariae. Their analysis under implied weights placed entelegyne palpimanoids

Table 2. Core areas used for Chao-Sørensen analysis of community similarity. Elevation range is approximate. See Fig. 1B.

Core Area	Elevation Range	Adult Specimens	Observed Species
Heipu	2000-2800	275	8
Shibali	1400-3700	343	10
Fengxue	1100-3200	223	12
Nankang	1500-2500	172	8

with paracymbia (i.e., Mimetidae and Pararchaeidae) sister to Araneoidea (Griswold et al. 2005: fig. 217) and their equal weights and successive weights analyses place all palpimanoids, including the haplogyne Archaeidae and Huttoniidae, closely related to Araneoidea (Griswold et al. 2005: fig. 218). Blackledge et al.'s (2009) phylogenetic analysis based on morphology, behavior, and molecular sequence data suggested that Nicodamidae belongs within Araneoidea and also corroborated placement of Mimetidae within Araneoidea. In sum, the placement of malkarids, mimetids, micropholcommatids, pararchaeids, and nicodamids within Araneoidea, seems well corroborated, whereas the placement of archaeids and other haplogyne palpimanoids deserves further study. The spiders treated in this paper have all the above synapomorphies with the exception of the paracymbium, which is lacking in Anapidae and Symphytognathidae and ambiguous in Mysmenidae.

Symphytognathoidea. Griswold et al. (1998) suggested that the families Theridiosomatidae, Anapidae, Mysmenidae and Symphytognathidae form a clade united by the following morphological synapomorphies: posteriorly truncate sternum (reversed in *Maymena*; Griswold et al. 1998: character 43), loss of the claw on the female palp (Griswold et al. 1998: character 53), greatly elongate fourth tarsal median claw (reversed in the Anapidae; Griswold et al. 1998: character 63), absence of the fovea (Schütt 2003: character 7); a sternum that is domed or at least considerably convex in lateral view (Schütt 2003: character 13), and the position of the tarsal organ in the basal third of the tarsi of all legs (Schütt 2003: character 39). Potential behavior synapomorphies for Symphytognathoidea include double attachment of the eggsac near the hub (Griswold et al. 1998: character 91), loss of the wrap bite attack (Griswold et al. 1998: character 92), construction of three-dimensional orb webs (Griswold et al. 1998: character 82) with anastomosed radii (Griswold et al. 1998: character 84) and addition of hub loops after sticky spiral construction is complete (Griswold et al. 1998: character 88).

Schütt (2003) added Micropholcommadtidae (as a synonym of Anapidae) to the Symphytognathoidea and also included the genus *Cepheia* Simon, 1894, which became part of the family Synaphridae (Marusik and Lehtinen 2003). The relationship of Synaphridae to other araneoids was explored by Lopardo and Hormiga (2008). They modified characters and added taxa and characters to two existing morphology-based data matrices. Modification of Schütt's (2003) matrix placed Synaphridae within the Symphytognathoidea while modification of Griswold et al.'s (1998) matrix placed Synaphridae in a clade sister to Cyatholipidae which in turn was sister to Symphytognathoidea. Lopardo and Hormiga (2008) cautiously favored this later result (see also Lopardo et al. 2007) but did not consider the question of araneoid family interrelationships to be resolved. Neither synaphrids nor micropholcommatids have been found in the Gaoligongshan so their relationship to symphytognathoids is outside the scope of this study. However, synaphrids and micropholcommatids are considered in discussions of some morphological characters.

Family Theridiosomatidae Simon, 1881

Theridiosomatid genera were reviewed by Coddington (1986a). Since then, new species have been described but the systematic structure of the family has remained almost unchanged. The only exceptions are found in Saaristo's (1996) work, which included the revalidation of *Andasta* Simon, 1895, reversing Coddington's (1986a) synonymy with *Theridiosoma* O. Pickard-Cambridge, 1879, and the creation of the new genus *Zoma* Saaristo, 1996. Coddington (1986a) noted that some species groups within *Theridiosoma* might warrant generic status but synonymized *Andasta* and *Theridiosoma* pending further study of the phylogenetic relationships within the group. We have no prejudice about whether such a study would support reciprocally monophyletic clades that could be usefully circumscribed as *Andasta* and *Theridiosoma*. We are critical of Saaristo's revalidation of *Andasta* in a work with narrow geographic focus, rather than as part of a global treatment of the group including a list of species assigned to each genus. A second species of *Zoma*, including the first known male, is described here. The new genus *Coddingtonia* is established to accommodate a remarkable theridiosomatid known only from the female.

All theridiosomatids except members of the Neotropical genus *Chthonos* Coddington, 1986 build orb webs though some are so highly modified as to be hardly recognizable as such. As is typical of members of this genus elsewhere, Gaoligongshan members of *Theridiosoma* build an orb that is pulled down into a cone by a tension line held by the spider at the hub (Fig. 7C, D). *Ogulnius* in the Gaoligongshan also build orbs that are typical of that genus (Fig. 7A, B): the webs have sparse non-sticky elements, lack a frame, have radii attaching directly to the substrate that join to one another irregularly near the hub, and have a sticky spiral winding in an irregular trajectory.

Diagnosis. Theridiosomatidae are small to minute spiders with short to medium length legs and large male palpal bulbs (Figs 4A, 12A). Synapomorphies for the family proposed by Coddington (1986a) are a pair of pits on the anterior margin of the sternum near the labial base (Fig. 4D; character 41, absent from the Neotropical genus *Chthonos*), connate spermathecae (Fig. 11B, D; character 47), and an elongate dorsal trichobothrium on tibia IV (character 43). These features serve to diagnose the theridiosomatids of the Gaoligongshan, except that the spermathecae of the new genus *Coddingtonia* are separate (Fig. 11F) rather than connate.

Key to Gaoligongshan Theridiosomatidae

1	Females	**2**
	Males	**9**
2(1)	Abdomen subtriangular, tapered posteriorly (Fig. 8B). Spermathecae separated by nearly their diameter (Fig. 11F)...	***Coddingtonia euryopoides* sp. n.**
–	Abdomen subspherical, not distinctly tapered posteriorly. Spermathecae juxtaposed (Fig. 3D)	**3**

3(2) Scape protrudes from beneath epigynal plate (Figs 11C, 14C) ..... ***Wendilgarda muji* sp. n.**

– Scape absent (Fig. 11A) or if present (Fig. 3E) then a simple extension of the epigynal plate..... **4**

4(3) Posterior median eyes separated by at least their diameter (Fig. 4C) ..... ***Ogulnius barbandrewsi* sp. n.**

– Posterior median eyes separated by less than their diameter..... **5**

5(4) Epigynum subtriangular, pointed posteriorly with concave margins so medial part is more acute than lateral part (Fig. 3E) ..... ***Baalzebub nemesis* sp. n.**

– Epigynum otherwise, typically subrectangular (Fig. 11A)..... **6**

6(5) Epigynum with a deep atrium, height of opening about one third the width in posterior view (Fig. 3B), without fleshy tissue at posterior margin of epigynum. Lateral pits absent..... ***Epeirotypus dalong* sp. n.**

– Atrium absent (Fig. 3F) or slit-like (Fig. 13A), height of opening (if visible) much less than one third the width in posterior view. Region between posterior margin of epigynum and abdomen often with fleshy tissue (Fig. 3F). Lateral pits present (Fig. 9B)..... **7**

7(6) Epigynum with pair of processes arising from posterolateral margin running towards each other (Fig. 3H) ..... ***Theridiosoma shuangbi* sp. n.**

– Epigynum without pair of processes arising from posterolateral margin **8**

8(7) Posterior margin of epigynum with median longitudinal slit (Figs 3F, 9A). Abdomen tan with dark gray with silver patches ..... ***Theridiosoma diwang* sp. n.**

– Posterior margin of epigynum entire (Fig. 11A). Abdomen dark gray with silver patches forming curved transverse stripe (Fig. l0A) ..... ***Zoma dibaiyin* sp. n.**

9(1) With long, filliform embolic apophysis (Figs 4G, 14A)..... **10**

– Embolic apophysis absent (Fig. 2C)..... ***Epeirotypus dalong* sp. n.**

10(9) Posterior median eyes separated by about their diameter..... ***Ogulnius barbandrewsi* sp. n.**

– Posterior median eyes separated by less than half their diameter..... **11**

11(10) Palpal tibia with one trichobothrium. Median apophysis sclerotized with concave dorsal margin (Fig. 12E)..... ***Wendilgarda muji* sp. n.**

– Palpal tibia with two trichobothria. Median apophysis fleshy, with pointed dorsal apex (Fig. 10D) ..... ***Zoma dibaiyin* sp. n.**

Genus *Epeirotypus* O. Pickard-Cambridge, 1894

Epeirotypus O. Pickard-Cambridge, 1894: 134. Type species *Epeirotypus brevipes* O. Pickard-Cambridge, 1894.

***Epeirotypus dalong* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:1E0E0249-EBA3-4A46-A5D1-B1E4D50426C4
Figs 2, 3A-B, 94

Material Examined. Holotype: CHINA: Yunnan: Fugong Co., 4.5 km N Aludi Village, 22.1 km N Fugong, 26.10829°N, 98.87162°E, 1250 m, 23 April 2004, in stream gorge, C. Griswold, CGY07 (CASENT 9020742, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9029330, HNU), 1 ♀, 4 juvs; [same data as holotype] (CASENT 9020743, CAS), 1 ♀, 4 juvs.

Etymology. Formed from the Chinese words for big (dà 大) and hole (lóng 窿), referring to the form of the epigynal atrium.

Diagnosis. Males distinguished from other described *Epeirotypus* species by the tuberculate texture of the mesal lobe of the tegulum (Fig. 2C); females distinguished by the more open atrium of the epigynum (Fig. 3B; compare to Coddington 1986a: figs 46, 57) and by the central interruption of the transverse submarginal groove (Fig. 3A; groove continuous across center in other described *Epeirotypus* species, Coddington, 1986a: figs 50, 58). Further distinguished from *E. brevipes* (Coddington, 1986a: fig. 47) by the lack of humps on the abdomen.

Only two *Epeirotypus* species are described, both from the Neotropics. Coddington (1986a) noted the existence of several undescribed species including possibly some from Malaysia; this is the first formally described *Epeirotypus* from Asia.

Description. Carapace tan, brown from thoracic region to ocular region. Sternum orange with broad dark brown margins. Legs orange, dark brown distally at joints, especially tibiae. Abdomen tan with brown or dark gray patches and silver spots.

Male palp: Palpal patella with strong sinuous macroseta (Fig. 2C). Palpal tibia with two trichobothria. Paracymbium elongate with curve near base (Fig. 2B). Tegulum large, mesal lobe tuberculate (Fig. 2C). Median apophysis lightly sclerotized, with fine distoventral projection (Fig. 2A). Conductor a complex of sclerotized and membranous structures enveloping thick embolus for most of its length (Fig. 2A).

Vulva: Epigynum a deep atrium with pair of humps on posterior margin leading to transverse grooves (Fig. 3B).

Male (CASENT 9020742): Total length 1.92, carapace 0.87 long, 0.84 wide, clypeus 0.20, sternum 0.47 long, 0.48 wide, coxa IV separated by 1.54 times their width. Posterior median eyes separated by less than half their diameter. Macrosetae: Leg I: femur p1, r1, patella d1, tibia d2, p1, r1; Leg II: patella d1, tibia d2, r1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.17; TmII: 0.17; TmIII: 0.17. Leg measurements: see Appendix A.

Female (CASENT 9020743): Total length 2.00, carapace 0.85 long, 0.83 wide, clypeus 0.18, sternum 0.49 long, 0.47 wide, coxa IV separated by 1.52 times their width. Posterior median eyes separated by less than a quarter their diameter. Macrosetae as in male. Metatarsal trichobothria: TmI: 0.15; TmII: 0.16; TmIII: 0.19. Leg measurements: see Appendix A.

Genus *Ogulnius* O. Pickard-Cambridge, 1882

Ogulnius O. Pickard-Cambridge, 1882: 432. Type species *Ogulnius obtectus* O. Pickard-Cambridge, 1882.

Coddington (1986a) diagnosed *Ogulnius* in part by the observation that the fourth legs are longer than the first, at least in females. However, at least *O. yaginumai* Brignoli, 1981 and the new species described below have the first and second legs longer than the fourth.

Ogulnius barbandrewsi Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:40A5E4AA-C340-4DE7-8B56-A361FF386056
Figs 3C-D, 4-6, 7A-B, 94

Material Examined. Holotype: CHINA: Yunnan: Gongshan Co., Bingzhongluo Township, Guocai He at Fucai, 28.00858°N, 98.51894°E , 2800 m, 23 August 2006, tropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, D.H. Kavanaugh, JM06082301 (CASENT 9029332, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9024438, HNU), 1 ♂, 1 ♀, 1 juv; [same data as holotype] (CASENT 9029332, HNU), 1 ♂; [same locality] 16 August 2006, tropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, JM06081602 (CASENT 9024445, CAS), 2 ♂, 4 ♀, 1 juv; Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, No. 12 Bridge Camp area, 16.3 airkm W of Gongshan, 27.715°N, 98.502°E, 2775 m, 15-19 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9016271, CAS), 7 ♂, 55 ♀, 40 juvs; [same data] (CASENT 9016273, HNU), 1 ♂, 11 ♀, 2 juvs; [same data], in Pimoa webs (CASENT 9029333, CAS), 1 ♂, 1 juv; Nujiang Prefecture, native forest in Gaoligongshan at 9.5 road km ESE Pianma, 25.98333°N, 98.66667°E, 2500 m, 15-18 October 1998, C. Griswold, D. Kavanaugh, C.L. Long (CASENT 9029335, HNU), 2 ♀, 7 juvs; [same data] (CASENT 9029334, HNU), 1 ♂, 2 ♀, 1 juv.

Etymology. Named for Barb Andrews, who helped guide the 2006 expedition to Kawakarpushan, including a stop at the type locality of this species.

Diagnosis. Female similar to *O. pullus* Bösenberg & Strand, 1906, distinguished from this species by the shape of the posterior lip of the epigynum in dorsal view, convex in *O. pullus* (Brignoli 1981: fig. 1), concave in *O. barbandrewsi* (Fig. 3D); by the posterolateral margins in ventral view, nearly straight and flush with abdomen in *O. pullus* (Chikuni 1989), bowed out from abdomen in *O. barbandrewsi* (Fig. 3C).

Diagnosis of male tentative because few (especially Asian) species have been described from the male and some descriptions are extremely limited in detail. Probably most similar to *O. pullus* (photographs in Chikuni 1989), distinguished from other species without abdominal humps by details of the shape of the median apophysis and embolic apophysis (Fig. 4E,G).

Description. Carapace, sternum, legs orange. Abdomen light gray mottled with dark purple, with dark purple dorsomedian stripe with uneven margins (Fig. 4A-D).

Male palp: Palpal tibia with one trichobothrium. Paracymbium oblong with filiform projection distally (Fig. 5D). Tegulum squamate (Fig. 5E). Median apophysis with apex oriented distodorsally (Fig. 5C). Conductor semitransparent (Fig. 4E). Embolic apophysis long and filiform (typical for genus; Fig. 4G).

Vulva: Epigynum with transverse ridge near lip (Fig. 6A), posterolateral margins bowed out from abdomen (Fig. 3C). Spermathecae juxtaposed (Fig. 3D). Copulatory ducts wide at entrance (Fig. 3D).

Male (CASENT 9024445): Total length 1.24, carapace 0.56 long, 0.50 wide, clypeus 0.12, sternum 0.31 long, 0.34 wide, coxa IV separated by 2.00 times their width. Posterior median eyes separated by about their diameter. Macrosetae: Leg I: patella d1, tibia p1; Leg II: patella d1; Leg III: patella d1; Leg IV: patella d1. Metatarsal trichobothria: TmI: 0.12; TmII: 0.16; TmIII: 0.11. Leg measurements: see Appendix A.

Female (CASENT 9024445): Total length 1.57, carapace 0.51 long, 0.52 wide, clypeus 0.11, sternum 0.34 long, 0.34 wide, coxa IV separated by 1.90 times their width. Posterior median eyes separated by at least their diameter. Macrosetae as in male. Metatarsal trichobothria: TmI: 0.09; TmII: 0.13; TmIII: 0.15. Leg measurements: see Appendix A. Spinnerets (Fig. 6B-D).

Natural History. This species builds a sparse orb web (Fig. 7A-B).

Genus *Baalzebub* Coddington, 1986

Baalzebub Coddington, 1986a: 71. Type species *Baalzebub baubo* Coddington, 1986.

Baalzebub nemesis Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:290E4BBE-C5FB-4CA9-8DDD-A1B35E265E75
Figs 3E, 8A, 95

Material Examined. Holotype: CHINA: Yunnan: Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, No. 12 Bridge Camp area, 16.3 airkm W of Gongshan, 27.715°N, 98.502°E, 2775 m, 15-19 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9016270, HNU), 1 ♀.

Paratype: [same data as holotype] (CASENT 9016274, CAS), 1 ♀.

Etymology. From Greek mythology, Nemesis is the punisher of hubris.

Diagnosis. Distinguished from other *Baalzebub* species by the taper of the epigynal scape, which is distinctly more acute medially than laterally (Fig. 3E).

Description. Carapace brown, darker margin and through head region. Sternum dark brown. Legs with light brown femora, distal segments dark brown. Abdomen dark gray with 3-4 transverse rows of three light spots posteriorly, plus one dorsal light spot and one lateral spot on each side (Fig. 8A).

Vulva: Epigynum smooth, subtriangular with concave margins so medial part is more acute than lateral part. Central pit near anterior margin (Fig. 3E).

Female (CASENT 9016274): Total length 1.68, carapace 0.70 long, 0.67 wide, clypeus 0.15, sternum 0.44 long, 0.43 wide, coxa IV separated by 1.54 times their width. Posterior median eyes separated by about a third their diameter. Macrosetae: Leg I: patella d1, tibia d2, p1, r1; Leg II: patella d1, tibia d2, r1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.19; TmII: 0.19; TmIII: 0.19. Leg measurements: see Appendix A.

Male unknown.

Genus *Theridiosoma* O. Pickard-Cambridge, 1879

Theridiosoma O. Pickard-Cambridge, 1879: 193. Type species *Theridiosoma argenteolum* O. Pickard-Cambridge, 1879 (= *T. gemmosum* (L. Koch, 1877)).

Theridiosoma diwang Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:04A2A54B-80C1-4672-BEEA-4C9886BBF3FF

Figs 3F-G, 7C-D, 8C-E, 9, 94

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km 23.5, 24.82888°N, 98.76001°E, 2020 m, 26 May 2005, good primary broadleaf forest, dusting webs in understory, C. Griswold, CGY126 (CASENT 9022370, HNU), 1 ♀.

Paratypes: [same data as holotype] (CASENT 9022369, HNU), 2 ♀; [same locality] 26 May 2005, good primary broadleaf forest, night collecting, C. Griswold, D. Kavanaugh, CGY127 (CASENT 9022395, CAS), 2 ♀; [same locality] 27-28 May 2005, good primary broadleaf forest, dusting webs in understory, C. Griswold, CGY128 (CASENT 9029347, CAS), 2 ♀; [same data] (CASENT 9022372, CAS), 1 ♀; [same locality] 28 May 2005, good primary broadleaf forest, night collecting, C. Griswold, D. Kavanaugh, CGY129 (CASENT 9022171, HNU), 2 ♀; Xiao Hei Shan Nature Reserve (Gu Cheng Shan Mtn.), 24.82886°N, 98.75917°E, 2010 m, 26 May 2005, in the forest, Yan Heng-mei, GKJ026 (CASENT 9022032, HNU), 1 ♀.

Etymology. Formed from the Chinese words for ground (dì 地) and net (wǎng 网); the webs of these spiders are built just above the leaf litter (Fig. 7C-D).

Diagnosis. Distinguished from well known Asian *Theridiosoma* species by the details of the genitalia including the presence of a notch along the posterior margin (contrast with *T. taiwanica* Zhang, Zhu & Tso, 2006: fig. 2) and the lack of paired processes (as in *T. epeiroides* Bösenberg & Strand, 1906, see Brignoli 1981: fig. 9; *T. shuangbi* sp. n.: Fig. 3H). Some species never illustrated or inadequately described are not considered in this diagnosis.

Description. Carapace brown with darker patches in thoracic and head regions (Fig. 8C-D). Sternum yellow with wide dark brown margin (Fig. 8E). Legs yellow to brown with distal part of metatarsi darker (especially leg IV). Abdomen tan with dark gray with silver patches (Fig. 8C-D).

Vulva: Epigynum a flat plate with median notch on posterior margin (Figs 3F, 9A); with pair of round lateral pits (Fig. 9B). Spermathecae subspherical, juxtaposed; copulatory ducts short, wide, ectal to spermathecae; fertilization ducts arise from posterolateral part of spermathecae, terminate in spiral tip just posterior to spermathecae (Fig. 3G).

Female (CASENT 9022395): Total length 1.60, carapace 0.75 long, 0.63 wide, clypeus 0.10, sternum 0.38 long, 0.35 wide, coxa IV separated by 1.30 times their width. Posterior median eyes juxtaposed. Macrosetae: Leg I: patella d1, tibia d2, p1; Leg II: patella d1, tibia d2, v2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.14; TmII: 0.16; TmIII: 0.20. Leg measurements: see Appendix A. Spinnerets (Fig. 9C-F).

Male unknown.

Natural History. This species builds an orb web above leaf litter (Fig. 7C-D) with the orb pulled into a cone.

Theridiosoma shuangbi Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:624239B5-E929-4492-872E-25575391B796
Figs 3H-I, 95

Material Examined. Holotype: CHINA: Yunnan: Long ling Co., Longjiang Township, Xiao hei shan Nature Reserve (Gu Cheng Shan Mtn.), 24.82886°N, 98.75917°E, 2010 m, 26 May 2005, in the forest, Yan Heng-mei, GKJ026 (CASENT 9022033, HNU), 1 ♀.

Etymology. Formed from the Chinese words for pair (shuāng 双) and arm (bì 臂), referring to the paired processes on the epigynum.

Diagnosis. Distinguished from *T. epeiroides* (the only other Asian *Theridiosoma* species with lateral processes of the epigynum) by the shape and orientation of the apophyses, directly towards each other in *T. shuangbi* (Fig. 3H), posteromesally in *T. epeiroides* (Brignoli, 1981: figs 9, 10).

Description. Carapace dusky pale yellow, darker centrally and through head region. Sternum dusky pale yellow with darker margin. Legs orange. Abdomen off white with pair of medium gray stripes running posteriorly from anterodorsal part of abdomen, converging to a single stripe running to spinneret region.

Vulva: Epigynum a flat plate with small median process, with pair of oblong lateral pits, lateral processes arise from near outside margin, run towards each other on longitudinal axis, tips rounded (Fig. 3H). Spermathecae and copulatory ducts both touching medially (Fig. 3I).

Female (holotype): Total length 2.00, carapace 0.72 long, 0.61 wide, clypeus 0.14, sternum 0.39 long, 0.38 wide, coxa IV separated by 1.41 times their width. Posterior median eyes nearly juxtaposed. Macrosetae: Leg I: patella d1, tibia d2, p1, r1; Leg II: patella d1, tibia d2, r1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.22; TmII: 0.25; TmIII: 0.21. Leg measurements: see Appendix A.

Male unknown.

Genus *Zoma* Saaristo, 1996

Zoma Saaristo, 1996: 51. Type species *Zoma zoma* Saaristo, 1996.

Zoma dibaiyin Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:C485899B-AB91-4989-9030-FC121273311D

Figs 10, 11A-B, 13A-D, 94

Material Examined. Holotype: CHINA: Yunnan; Fugong Co., Pee He, 40 km S Shangpa, SW of R., 26.54323°N, 98.89837°E, 1153 m, 23 August 2005, sifting bamboo litter at cliff base, P. Paquin, PP-4905 (CASENT 9029331, HNU), 1 ♀.

Paratypes: [same data as holotype] (CASENT 9020480, CAS), 1 ♂, 1 ♀; [same data as holotype] (CASENT 9020482, CAS), 1 ♀; [same data as holotype] (CASENT 9020481, HNU), 1 ♀; Fugong Co., Lishadi, 5 km N Shangpa (Fungong), SW of river, 26.95990°N, 98.86726°E, 1217 m, 26 August 2005, sifting deciduous litter in open area with few trees, P. Paquin, PP-5505 (CASENT 9020476, HNU), 2 ♀, 2 juvs; [same data] (CASENT 9020475, CAS), 1 ♀, 1 juv.

Etymology. Formed from the Chinese words for ground (dī 低) and silver (bái yín 白银), referring to the silver corpuscles of this leaf litter spider.

Diagnosis. Male distinguished from other Theridiosomatidae except *Ogulnius* and the theridiosomatine genera *Baalzebub*, *Epilineutes* Coddington, 1986, *Wendilgarda* Keyserling, 1886 and *Theridiosoma* by the presence of a filiform embolic apophysis extending beyond the conductor tip (Fig. 10F); embolic division with moderate branching similar to *Ogulnius*, less complex than the theridiosomatine genera; distinguished from *Ogulnius* by the juxtaposed posterior median eyes (Fig. 10B; separated by at least their diameter in *Ogulnius*, Fig. 4C).

Female distinguished from *Z. zoma* Saaristo, 1996 by the posterior margin of the epigynum, which is more convex in *Z. zoma* (Saaristo 1996: fig. 1), nearly transverse in *Z. dibaiyin* (Fig. 11A).

This is the second *Zoma* species described and the first known from the male.

Description. Carapace dark brown. Sternum brown with dark margin. Legs dark brown, distal segments reddish. Abdomen dark gray with silver patches forming curved transverse stripe (Fig. 10A-C). (Description of coloration based on females; single male specimen teneral.)

Male palp: Palpal tibia with one trichobothrium. Paracymbium elongate with sharp tip, curved near base (Fig. 10E). Tegulum smooth except for rough ventral ridge near tip of conductor in unexpanded conformation (Fig. 10F). Median apophysis lightly sclerotized, much taller than wide, dorsal tip pointed, ventral tip rounded (Fig. 10D). Conductor semitransparent (Fig. 10D). Embolic apophysis long and filiform (Fig. 10F).

Vulva: Epigynum a flat plate with a darkly sclerotized posterior lip, with shallow median and smaller lateral pits (Figs 11A,B, 13A). Spermathecae subspherical, juxtaposed, set in anterior part of epigynum, copulatory ducts wide, follow simple curve (Fig. 11B).

Male (CASENT 9020480): Total length 1.35, carapace 0.65 long, 0.61 wide, clypeus 0.13, sternum 0.33 long, 0.34 wide, coxa IV separated by 1.60 times their width. Posterior median eyes juxtaposed. Macrosetae: Leg I: femur p1, r1, patella d1, tibia d2, p1, r1; Leg II: patella d1, tibia d2, r1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.16; TmII: 0.17; TmIII: 0.19. Leg measurements: see Appendix A.

Female (CASENT 9020482): Total length 1.84, carapace 0.74 long, 0.63 wide, clypeus 0.11, sternum 0.40 long, 0.35 wide, coxa IV separated by 1.29 times their width. Posterior median eyes juxtaposed. Macrosetae as in male. Metatarsal trichobothria: TmI: 0.13; TmII: 0.14; TmIII: 0.20. Leg measurements: see Appendix A. Spinnerets (Fig. 13B-D); AG in shallow depression similar to that found in *Epeirotypus* (Griswold et al. 1998: figs 24D, 25D)

Genus *Wendilgarda* Keyserling, 1886

Wendilgarda Keyserling, 1886: 129. Type species *Wendilgarda mexicana* Keyserling, 1886.

Wendilgarda muji Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:FF5CF835-DD76-4CA5-A6B7-17B0913606C5
Figs 12, 11C-D, 13E-E, 14, 96

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Long jiang Township, Xiao Hei Shan Nature Reserve (Gu Cheng Shan Mtn.), 24.82886°N, 98.75917°E, 2010 m, 26 May 2005, in the forest, Yan Heng-mei, GKJ026 (CASENT 9022037, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022036, CAS), 1 ♂, 2 ♀; [same data as holotype] (CASENT 9022035, HNU), 1 ♀; Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km23.5, 24.82888°N, 98.76001°E, 2020 m, 28 May 2005, good primary broadleaf forest, night collecting, C. Griswold, D. Kavanaugh, CGY129 (CASENT 9022611, CAS), 1 ♀; Longyang Co., Bawan Township, forest below Dasheyao Forestry Station in Hunan He valley,

24.92597°N, 98.75806°E, 2272 m, 3 June 2005, disturbed forest, beating understory vegetation, C. Griswold, CGY136 (CASENT 9022390, HNU), 1 ♂.

Etymology. Formed from the Chinese words for wood (mù 木) and rooster (jī 鸡), referring to the element and animal of the Chinese zodiac when this species was collected.

Diagnosis. Among Asian *Wendilgarda* species, male most similar to *W. sinensis* Zhu & Wang, 1992; apparently distinguished from this species by details of the embolic division and median apophysis (Fig. 12E, G; Song, et al., 1999: fig. 84E, F) and the more domed carapace shape in *W. sinensis* (Fig. 12A-B; Zhu and Wang 1992: fig. 1), but published work on this species is inadequate to make a more explicit diagnosis. Distinguished from *W. assamensis* Fage, 1924 by the lack of a two part ventral apophysis (unclear from the drawings whether this is the median apophysis or some other structure), one hooked and the other straight (Brignoli 1981: figs 5-6); from *W. coddingtoni* Zhu, Zhang & Chen, 2001 by the lack of an auxiliary retrobasal process in addition to the paracymbium (Fig. 13F; Zhu et al. 2001: fig. 7).

Female distinguished from other Asian species except *W. sinensis* by the blunt scape tip and distinctly concave posterior margin of the epigynum (Fig. 11D); distinguished from *W. sinensis* by details of the epigynum shape including a deeper median invagination of the posterior margin in *W. muji* (Fig. 11D) than in *W. sinensis* (Song et al. 1999: fig. 84C).

Description. Carapace tan. Sternum dark gray. Legs with femora and patellae tan, distal segments light brown to orange. Abdomen tan with brown to dark gray patches (Fig. 12A-D).

Male palp: Palpal patella with sinuous macroseta (Fig. 12E). Palpal tibia with two trichobothria. Paracymbium hook-like with blunt tip (Fig. 14B). Tegulum smooth, bulbous (Figs 12F, 13F). Median apophysis with larger dorsal and smaller ventral lobes (Figs 12G, 13E). Embolic division a complex series of apophyses visible through semi-transparent conductor (Fig. 12G); one filiform embolic apopysis extends beyond conductor tip, runs along conductor on mesal face of bulb nearly to cymbial margin (Figs 12E, 13E, 14A).

Vulva: Epigynum with transverse ridges, rounded lateral lobes (Figs 11C, 14C), median part of posterior margin a gently rounded concavity revealing scape with blunt tip (Fig. 11D).

Male (CASENT 9022036): Total length 1.48, carapace 0.59 long, 0.66 wide, clypeus 0.15, sternum 0.38 long, 0.38 wide, coxa IV separated by 2.00 times their width. Posterior median eyes separated by about one third their diameter. Macrosetae: Leg I: patella d1, tibia d2, p1; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.16; TmII: 0.19; TmIII: 0.23. Leg measurements: see Appendix A.

Female (CASENT 9022036): Total length 1.88, carapace 0.59 long, 0.62 wide, clypeus 0.12, sternum 0.39 long, 0.39 wide, coxa IV separated by 1.91 times their width. Posterior median eyes separated by about two thirds their diameter. Macrosetae as in male. Metatarsal trichobothria: TmI: 0.19; TmII: 0.22; TmIII: 0.23. Leg measurements: see Appendix A. Spinnerets (Fig. 14D-F).

Genus *Coddingtonia* Miller, Griswold & Yin, gen. n.
urn:lsid:zoobank.org:act:AECD1D6F-C837-40CA-85D5-C7612118F7F1

Type species. *Coddingtonia eruyopoides* Miller, Griswold & Yin, sp. n.

Etymology. Named for Jonathan Coddington in honor of his contributions to theridiosomatid behavior and systematics. The gender is feminine.

Diagnosis. Distinguished from other theridiosomatids by the spermathecae, which are separated by nearly their diameter in *Coddingtonia* (Fig. 11F), juxtaposed and partially fused in nearly all other theridiosomatids (Coddington 1986a), and by the extremely long, thin, coiled copulatory ducts, usually a simple arc, never coiled in other theridiosomatids.

Species. *Coddingtonia eruyopoides*, sp. n.

***Coddingtonia euryopoides* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:CAB5D9FB-CC13-4A49-9A6D-61E3F8C9343C
Figs 8B, 11E-F, 94

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Mangkuan Township, Zaotang He at Baihualing village, 25.30450°N, 98.80059°E, 1635 m, 2 June 2005, good subtropical broadleaf forest, dusting webs in understory, C. Griswold, CGY135 (CASENT 9022403, HNU), 1 ♀.

Paratype: [same data as holotype] (CASENT 9029336, CAS), 1 juv.

Etymology. Named for its superficial similarity to members of the theridiid genus *Euryopis* Menge, 1868. The epithet is in the form of a Latin adjective.

Diagnosis. Monotypic genus; see diagnosis for genus.

Description. Carapace dark brown. Sternum dusky orange with darker margin. Legs orange, femora dusky, distal part of tibiae and metatarsi I, II, and IV dark brown. Abdomen mottled dark gray, dorsum lighter with fingerprint texture, with posterior tubercle, sparsely clothed with long, strong setae (Fig. 8B).

Vulva: Epigynum a subrectangular smooth flat plate, posterior margin slightly convex, with two obliquely transverse grooves near posterior margin (Fig. 11E). Spermathecae subspherical, separated by about their diameter. Copulatory ducts very long and thin, lightly sclerotized and encircling spermathecae many times for most of length, more heavily sclerotized just before joining with spermathecae (Fig. 11F).

Female (holotype): Total length 1.63, carapace 0.61 long, 0.59 wide, clypeus 0.13, sternum 0.36 long, 0.38 wide, coxa IV separated by 1.50 times their width. Posterior median eyes separated by about half their diameter. Macrosetae: Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.28; TmII: 0.32; TmIII: 0.36. Leg measurements: see Appendix A.

Male unknown.

Family Mysmenidae Petrunkevitch, 1928

Recent authors have focused on a handful of characters to define Mysmenidae: the presence of a sclerotized subdistal ventral spot (Griswold et al. 1998: fig. 10G) on femur I (and sometimes II as well) of females (and sometimes males as well), the presence of a prolateral macroseta on male metatarsus I (Fig. 17D), and a distally twisted and notched cymbium (Platnick and Shadab 1978b, Griswold et al. 1998, Schütt 2003). Femoral spots are not universal in mysmenids, absent from the new genus *Gaoligonga* and most species of *Mysmenopsis* Simon, 1897 (Platnick and Shadab 1978b), which are otherwise typical mysmenids. The mysmenid cymbium is typically very complex, featuring a series of distal lobes that interact with the embolus as a functional conductor (e.g., Figs 24D, 37A, 40C). While this description seems to apply to most or all mysmenids (questionable in the new genus *Chanea*; Fig. 49A), it has apparently contributed to some confusion, such as the misplacement of the genus *Crassignatha* Wunderlich, 1995 in Mysmenidae (see below). Schütt (2003) coded the two mysmenids in her phylogenetic analysis as having non-homologous male metatarsal clasping spurs based on position (apical in *Microdipoena* Banks, 1895, basal in *Trogloneta* Simon, 1922). Some *Maymena* Gertsch, 1960 species also lack a metatarsal clasping spur (Gertsch 1960). Some male mysmenids have prolateral macrosetae on tibia I in addition to (rarely instead of) a metatarsal macroseta (e.g., *Anjouanella* Baert, 1986, *Microdipoena* Banks, 1895, *Mysmenella* Brignoli, 1980, *Simaoa* gen. n.; Fig. 34F). Nevertheless, the clasping spur on male metatarsus I, whether proximal or distal, remains a key diagnostic character for Mysmenidae. In addition, most mysmenids have a distinctive modified seta on the PLS (Figs 19F, 42F, Griswold et al. 1998: fig. 28A; absent from the kleptoparasitic *Isela* Griswold, 1985, which also lacks the triplet of spigots used to make araneoid sticky silk in both sexes; Griswold et al. 1998: figs 29D, 30D). The sticky silk triplet is vestigial in some Chinese mysmenid males (Fig. 25D) but is fully developed in some other male mysmenids (Griswold et al. 1998: fig. 28D).

Lateral sulci are present on the carapace of several mysmenid genera and range in form from a single pore between the lateral eyes and the margin of the carapace (Fig. 17F) and a larger hole just below the lateral eyes (Fig. 24E). Lopardo and Hormiga (2008) reported on a similar sulcus in the enigmatic genus *Acrobleps* Hickman, 1979. Anapids have one or more pores, typically associated with a plate or sulcus, on the anterolateral margin of the carapace (Platnick and Forster 1989).

The distinctive web architecture and associated behavioral characters help to define the limits of Mysmenidae. With the exception of *Maymena* (which builds a horizontal anapid-like orb-web) and the webless kleptoparasites, mysmenids build a three-dimensional spherical web, the result of typical orb-building behavior except that radii are not restricted to a single plane (Figs 20, 26; Coddington 1986b, Eberhard 1987, Griswold et al. 1998: fig. 3B). Small clusters (6-9) of eggs are placed in the center of the web (Figs 21H, 26B, D, 43C).

The limits and diagnostic features of many mysmenid genera are not entirely clear. Work in progress (Lopardo, pers. comm.) with a global scope promises substantial progress soon. But for the purposes of this geographically limited work, we must rely on the existing literature. New species were placed in the genus *Mysmena* Simon, 1894 based on the presence of an external cymbial groove (Figs 17A, 29A), a distinct cymbial base (Figs 17B, 24C, 29B), an embolus without a switchback or process that makes approximately one spiral turn usually guided by a groove in the tegulum (Figs 17B, 29C), a cymbial tip that engages the embolus as a functional conductor (Figs 24D, 29C), and male mating claspers restricted to metatarsus I (Figs 17D, 24F, 29D). The presence of an epigynum in the form of a scape with the left and right copulatory pathways well separated also influenced species placement (Figs 11I, 21C,E), although not all *Mysmena* described here have a scape (Fig. 21G,I). Internal structures consist of a pair of spermathecae, copulatory ducts usually with a sclerotized portion leading to the spermathecae and a membranous atrium (copulatory ducts occasionally membranous throughout their length; Fig. 21I). Sclerotized complexes (spermathecae or spermathecae plus part of copulatory ducts) are separated by at least their width (Fig. 21G). Fertilization ducts usually arise from the posterior part of the spermathecae and curve mesally, or arise from mesal part of spermathecae. A posterior tubercle on the abdomen is present (Fig. 27F) or absent (Fig. 15B). Also, all new *Mysmena* described here have femoral spots on legs I and II (sometimes indistinct in male), although the type species of *Mysmena* apparently has the femoral spot only on leg I (Kraus 1967).

Chinese *Maymena* described here differ from the American fauna in having the palpal patella and tibia elongated (Fig. 54A; compare to Gertsch 1960: fig. 51). Otherwise, they closely resemble typical *Maymena* in genital morphology, size and coloration, association with cave habitats, and web architecture. *Maymena* are apparently the only mysmenids with trichobothria on the palpal tibia (Fig. 55D), a trait shared with synaphrids and theridiosomatids among the symphytognathoids.

The remaining mysmenids were all placed in new genera. *Simaoa*, *Gaoligonga*, and *Chanea* all have novel features, especially male sexual characters. *Simaoa maku* and *S. bianjing* are known from female only and were tentatively placed in *Simaoa* based on characteristics of the female genitalia shared with *Simaoa* species known from both sexes. *Mosu* is the only new mysmenid genus known from the female only. The two species clearly share similarities in genital morphologies. Another Chinese species recently described in the genus *Mysmena* exhibits similar morphology in the female and could be congeneric. This species, *M. zhengi* Lin & Li, 2008, is known from both sexes and so could be useful for exploring the limits of this new genus.

Diagnosis. Femur I (and sometimes II as well) of females (and sometimes males as well) with a sclerotized subdistal ventral spot (sometimes absent), prolateral macroseta on metatarsus I of the male (Fig. 17D) forming a clasping spur, distally twisted and notched cymbium (Platnick and Shadab 1978b, Griswold et al. 1998, Schütt 2003), and distinctive modified seta on the PLS (Figs 19F, 42F) characterize Mysmenidae. Not all characters are present in all species.

Key to Gaoligongshan Mysmenidae

1 Total length greater than 2mm; trichobothria on palpal tibia (Fig,. 55D); tarsal organ set distal to proximal margin of tarsus (tarsal organ position *ca.* 0.15, Fig. 55F)..... ***Maymena*** **Gertsch, 1960.....2**

– Total length 1.5mm or less; palpal tibia without trichobothria; tarsal organ just beyond proximal margin of tarsus (tarsal organ position <0.1, Fig. 47F) **3**

2(1) Scape lateral margin notched, spermathecae separated by more than their width (Fig. 50G-H) (male unknown) .....***Maymena kehen*** **sp. n.**

– Scape lateral margin not notched, spermathecae separated by their width or less (Fig. 50F); male with elongate palpal tibia (Fig. 54A) ....***Maymena paquini*** **sp. n.**

3(1) Distal part of cymbium notched; clypeus lacking macrosetae, copulatory ducts not coiled around the fertilization ducts or coiled around fertilization ducts no more than 5 times **4**

– Distal part of cymbium entire (Fig. 49B); clypeus of male with macrosetae (Fig. 52B), long copulatory ducts coiled around the fertilization ducts more than 10 times (Fig. 49C)..... ***Chanea suukyii*** **sp. n.**

4(3) Femoral spots absent. Male with two moderate to strong setae near the base of each chelicera (Figs 38A, 46D).....***Gaoligonga*** **gen. n.**.....**5**

– Femoral spots present on femur I in both sexes. Macrosetae absent from male cheliceral bases.....**6**

5(4) Male with two strong macrosetae near the base of each chelicerae (Fig. 38A, 40E-F); embolic tip tapered (Fig. 40C); with cymbial tooth (Fig. 40B). Female with well sclerotized ventral plate of the epigynum with ridges radiating out from a raised knob (Figs 41A, 43A), reniform spermathecae, and sinuous ducts..... ***Gaoligonga changya*** **sp. n.**

– Male with weak macrosetae near the base of each chelicerae (Fig. 44A), embolic tip expanded (Fig. 46B); cymbial tooth absent. Female epigynum and raised knob less strongly sclerotized, spermathecae not strongly differentiated from nearly longitudinal ducts; Figs 43D-E, 47D)..... .....***Gaoligonga zhusun*** **sp. n.**

6(4) Male with four macrosetae on tibia I (Fig. 34F); female with spermathecae and spiraling copulatory ducts encapsulated together (Figs 31D, F, H-I)… .....***Simaoa*** **gen. n.** (male unknown in *S. maku* and *S. bianjing*) 7

– Male tibia I with fewer than four macrosetae or lacking these altogether; female with spermathecae and copulatory ducts separate, not encapsulated together **12**

7(6) Males.....**8**

– Females.....**9**

8(7) Palpal tibia long, with dorsal tooth-like apophysis (Fig. 34C); embolus makes a half turn (Fig. 33B) .....***Simaoa yaojia*** **sp. n.**

– Palpal tibia short, lacking dorsal tooth-like apophysis; embolus makes more than a full turn (Fig. 36A)..... ***Simaoa kavanaugh* sp. n.**

9(7) Epigynum with two transverse lobes, a raised anterior lobe and a low posterior lobe along epigastric furrow (Figs 30D, 37F)..... **10**

– Epigynum with small posteriorly projecting process, lacking a transverse anterior lobe (Fig. 31H) **11**

10(9) Copulatory ducts longitudinal (Fig. 31D); anterior lobe of epigynum narrow, fitting in the space between the spermathecae (Fig. 31C-D)..... ..... ***Simaoa yaojia* sp. n.**

– Copulatory ducts oblique (Fig. 31F); anterior lobe of epigynum wider than distance between spermathecae (Fig. 31E) ..... ***Simaoa kavanaugh* sp. n.**

11(9) Abdomen lacking posterior tubercle; fertilization ducts run towards each other after emerging from the copulatory duct spiral (Fig. 31H) .... ***Simaoa maku* sp. n.**

– Abdomen with posterior tubercle; fertilization ducts run obliquely anteriorly (Fig. 31I) ..... ***Simaoa bianjing* sp. n.**

12(6) Females..... **13**

– Males (*Mysmena* only; males of *Mosu* are unknown) **20**

13(12) Vulva with round, sclerotized spermathecae with sclerotized fertilization ducts and the copulatory duct membranous and convoluted for most of its length, sclerotized at end of path near spermathecae (Fig. 43G, I)..... .....***Mosu* gen. n.** **14**

– Vulva not as above.....***Mysmena* Simon, 1894**..... **15**

14(13) Spermathecae bulbous (Fig. 43G), membranous copulatory ducts in contact in the posteromedial region (Fig. 43G), abdomen with posterior tubercle..... .....***Mosu nujiang* sp. n.**

– Spermathecae transversely ovoid (Fig. 43I); membranous copulatory ducts separated (Fig. 31I); abdomen without posterior tubercle .....***Mosu huogou* sp. n.**

15(13) Epigynum with scape..... **16**

– Epigynum lacking scape..... **18**

16(15) Scape thicker basally than distally (Figs 18D, 21D..... **17**

– Scape of more or less uniform from base to rounded tip, long, soft, wrinkled (Fig. 18B) ..... ***Mysmena changouzi* sp. n.**

17(16) Epigynum a triangular scape, thick basally, evenly narrowed distally (Fig. 21D), tip with small posteriorly-directed process (Fig. 25F). Sclerotized portion of spermatheca/copulatory duct complexes separated by about 1.5 times their width (Fig. 21E) .....***Mysmena bizi* sp. n.**

– Epigynum a scape, base soft and wrinkled, projects ventrally, distal tip curves posteriorly (Fig. 18D). Sclerotized portion of spermatheca/copulatory duct complexes separated by nearly twice their width (Fig. 21C) .... ***Mysmena jinlong* sp. n.**

18(15) Spermathecae simple and round to oval, distinct from lightly sclerotized copulatory ducts (Figs 21I, 31B) **19**

–	Vulva with a spermatheca/copulatory duct complex (Fig. 21G) .... ***Mysmena goudao* sp. n.**
19(18)	Spermathecae separated by about 1.5 times their diameter, the path of the fertilization ducts J-shaped (Fig. 21I); posterior abdominal tubercle absent... ..... ***Mysmena haban* sp. n.**
–	Spermathecae separated by nearly three times their diameter in, the path of the fertilization ducts sinuous (Fig. 31B); posterior abdominal tubercle present (Fig. 27F) ..... ***Mysmena shibali* sp. n.**
20(12)	Clypeus convex..... **21**
–	Clypeus with distinctive, nose-like process (Fig. 24E).... ***Mysmena bizi* sp. n.**
21(20)	Cymbial groove studded with tubercles (Fig. 29B)... ***Mysmena goudao* sp. n.**
–	Cymbial groove with folds (Fig. 17A) ..... ***Mysmena changouzi* sp. n.**

Genus *Mysmena* Simon, 1894

Mysmena Simon, 1894: 588. Type species *Theridion leycoplagiatum* Simon, 1879 (= *M. leucoplagiata* (Simon, 1879))

Mysmena changouzi Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:3DE671ED-2BC6-4EE3-ACC5-B19342794CC7
Figs 11G-I, 15A-E, 16-17, 18A-C, 19, 20A, 96

Material Examined. Holotype: CHINA: Yunnan: Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, No. 12 Bridge Camp area, 16.3 airkm W of Gongshan, 27.715°N, 98.502°E, 2775 m, 15-19 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9029311, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9006233, CAS), 7 ♂, 20 ♀, 3 juvs; [same data as holotype] (CASENT 9029312, HNU), 7 ♂, 20 ♀, 4 juvs; Gaoligong Shan, Nujiang Prefecture: Gongshan Co., Danzhu He drainage, 13.5 airkm SSW of Gongshan, 27.631°N, 98.621°E, 2700 m, 31 June-5 July 2000, D. Kavanaugh, C. Griswold, H.-B. Liang, D. Ubick, H.-M. Yan, & D.-Z. Dong (CASENT 9016287, CAS), 1 ♀; Fugong Co., Lishadi, Shibali Yaku (pass #31), 27.21230°N, 98.69600°E, 3604 m, 5 August 2005, boulder field to bamboo thicket, under rocks, P. Paquin, PP-2105 (CASENT 9022563, HNU), 1 ♀, 1 juv; [same data] (CASENT 9022564, CAS), 1 ♀; Fugong Co., Lishadi, 500 m before Shibali Yaku (pass #31), 27.21354°N, 98.70021°E, 3585 m, 7 August 2005, stable scree slope on soil, P. Paquin, PP-2405 (CASENT 9022612, CAS), 1 ♂, 6 ♀, 5 juvs; [same data] (CASENT 9022610, HNU), 7 ♀, 5 juvs; Fugong Co., Lishadi, 10.5 km W of Shibali, 100 m N road, 27.20192°N, 98.71321°E, 3250 m, 17 August 2005, in wet leaf litter, conifer forest, rhododendron patch, P. Paquin, PP-4205 (CASENT 9022546, HNU), 1 ♀, 1 juv;

Fugong Co., Lishadi, 3 km W of Shibali (first waterfall), 27.17312°N, 98.76764°E, 3019 m, 9 August 2005, scree slope and moist ravine with rocky cliffs, P. Paquin, D. Kavanaugh, PP-2905 (CASENT 9022592, HNU), 1 ♀; [same data] (CASENT 9022591, CAS), 1 ♀; Shibali forest station, 27.16636°N, 98.77667°E, 2563 m, 4 May 2004, good forest, sifting leaf litter, C. Griswold, D. Kavanaugh, CGY28 (CASENT 9020063, HNU), 1 ♀; Fugong Co., 4.5 km N Aludi Village, 22.1 km N Fugong, 26.10829°N, 98.87162°E, 1250 m, 23 April 2004, in stream gorge, C. Griswold, CGY07 (CASENT 9020741, HNU), 1 ♀.

Etymology. Formed from the Chinese words for long (chān 梃) and hook (gōu zi 钩子), referring to shape of the epigynal scape.

Diagnosis. Male distinguished by the trilobate cymbial base (Fig. 17B). Further distinguished from *M. goudao* by the presence of folds across the cymbial groove (Fig. 17A), as opposed to tubercles in *M. guodao* (Fig. 29A). Female distinguished from other Chinese mysmenids except *Mysmenella pseudojobi* Lin & Li, 2008 by the long, soft, wrinkled scape of more or less uniform width from base to rounded tip (Fig. 18B); distinguished from *M. pseudojobi* by the clear differentiation between bulbous spermathecae and spiral copulatory ducts (Lin and Li 2008: fig. 12F), spermathecae not clearly differentiated from copulatory ducts in *M. changouzi* (Fig. 11I).

Description. Carapace tan with dusky markings, male with weak sulci closer to margin of prosoma than ALE (Fig. 17E-F). Sternum dusky brown. Legs light brown. Femoral spots on legs I and II, indistinct on II in male. Abdomen dark brown with white spots; posterior tubercle absent (Fig. 15A-E).

Male palp: Embolus spiral, follows tegular groove for most of length (Fig. 17B), engages with cymbium distally (Fig. 16B). Cymbium with trilobate base on prolateral side (Fig. 17B), middle part with wide shallow groove crossed by transverse striations (Fig. 17A), tip with two lobes (Fig. 17C).

Vulva: Epigynum a soft, flexible scape (Figs 11H, 18B). Sclerotized portion of spermatheca/copulatory duct complexes separated by nearly their width (Fig. 11I).

Male (CASENT 9006233): Total length 0.68, carapace 0.36 long, 0.35 wide, clypeus 0.10, sternum 0.25 long, 0.25 wide, coxa IV separated by 2.00 times their width. Macrosetae: Leg I: patella d1, tibia d1, metatarsus p1; Leg II: patella d1, tibia d1, v3; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macroseta nearly straight, only slightly kinked near center (Fig. 17D). Metatarsal trichobothria: TmI: 0.34; TmII: 0.41; TmIII: 0.29. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of three spigots each (Fig. 18C). Posterior lateral spinnerets with flagelliform and aggregate gland spigots reduced to nubbins (Fig. 19F).

Female (CASENT 9006233): Total length 0.92, carapace 0.41 long, 0.36 wide, clypeus 0.08, sternum 0.25 long, 0.25 wide, coxa IV separated by 1.79 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.33; TmII: 0.31; TmIII: 0.41. Leg measurements: see Appendix A. Spinnerets (Fig. 19A-D).

Natural History. This species builds a three-dimensional spherical web typical of the Mysmenidae (Fig. 20A).

***Mysmena jinlong* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:5742314C-7023-42D7-BF01-5ADC6C728641
Figs 15F-H, 18D, 21A-C, 95

Material Examined. Holotype: CHINA: Yunnan: Gaoligong Shan, Nujiang Prefecture: Gongshan Co., Danzhu He drainage, 15.7-16.0 airkm SW of Gongshan, 27.622-7°N, 98.587-92°E, 2900-3100 m, 30 June-5 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9029313, HNU), 1 ♀.

Paratypes: [same data as holotype] (CASENT 9016254, CAS), 3 ♀; [same data as holotype] (CASENT 9029314, HNU), 2 ♀; Fugong Co., Lishadi, 8-9 km W of Shibali, 27.20055°N, 98.71399°E, 3221 m, 8 August 2005, webs on rocky cliff, night collecting along the road, forest, P. Paquin, D. Kavanaugh, PP-2805 (CASENT 9022506, HNU), 1 ♀.

Etymology. Formed from the Chinese words for metal (jīn 金) and dragon (lóng 龙), referring to the element and animal of the Chinese zodiac when the holotype was first collected.

Diagnosis. Distinguished from *M. changouzi* by having the scape thicker basally than distally (Fig. 18D), from *M. goudao* by the presence of a scape (absent in *M. goudao*; Fig. 29F), from other Chinese *Mysmena* by the much longer distal part curved posteriorly and dorsally (Fig. 18D; compare to Figs 25F, 30A).

Description. Carapace pale yellow, darker in head region. Sternum medium brown. Legs pale yellow, darker distally. Femoral spots on legs I and II. Abdomen dark gray with series of white patches dorsally and pair of unjoined longitudinal white lines laterally; posterior tubercle absent (Fig. 15F-H).

Vulva: Epigynum a scape, base soft and wrinkled, projects ventrally, distal tip curves posteriorly (Fig. 18D). Sclerotized portion of spermatheca/copulatory duct complexes separated by nearly twice their width (Fig. 21C). Fertilization ducts arise from posterior part of spermathecae, curve mesally.

Female (CASENT 9016254): Total length 1.38, carapace 0.37 long, 0.38 wide, clypeus 0.07, sternum 0.26 long, 0.26 wide, coxa IV separated by 1.79 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.33; TmII: 0.32; TmIII: 0.39. Leg measurements: see Appendix A.

Male unknown.

***Mysmena bizi* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:70B6D158-6E66-478B-8A57-F9C428BA3574
Figs 21D-E, 22-25, 26A, 96

Material Examined. Holotype: CHINA: Yunnan: Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 13-15 May

2005, mixed broadleaf deciduous and evergreen forest, dusting small webs near ground in forest understory, C. Griswold, CGY104 (CASENT 9029310, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022371, CAS), 2 ♂, 28 ♀; [same data as holotype] (CASENT 9022347, HNU), 1 ♂, 29 ♀; [same data as holotype] (CASENT 9029338, CAS), 1 ♀; [same data as holotype] (CASENT 9029337, CAS), 1 ♀; Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 12-21 May 2005, mixed broadleaf deciduous and evergreen forest, pitfall traps, C. Griswold, D. Kavanaugh, K. Guo, CGY103 (CASENT 9023101, HNU), 2 ♂; Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 12 May 2005, mixed broadleaf deciduous and evergreen forest, winkler extraction of sifted leaf litter, C. Griswold, D. Kavanaugh, K. Guo, CGY102 (CASENT 9022326, CAS), 2 ♀; Lushui Co., Feng Xue Yakou, 100 m S of Pianma Road, 25.97288°N, 98.68336°E, 3150 m, 11-21 May 2005, Rhododendron/bamboo thicket, 25 pitfall traps, C. Griswold, D. Kavanaugh, K. Guo, CGY101 (CASENT 9022098, CAS), 1 ♀; Nujiang Prefecture, native forest in Gaoligongshan at 9.5 road km ESE Pianma, 25.98333°N, 98.66667°E, 2500 m, 15-18 October 1998, C. Griswold, D. Kavanaugh, C.L. Long (CASENT 9029319, CAS), 2 ♂, 10 ♀, 11 juvs; (CASENT 9029320, HNU), 1 ♂, 10 ♀, 11 juvs; (CASENT 9023958, CAS), 1 ♀.

Etymology. Formed from the Chinese word for nose (bí zi 鼻子), referring to the process on the male clypeus.

Diagnosis. Male distinguished by the distinctive clypeal process (Fig. 24E). Further distinguished by the undivided cymbial tip (Fig. 24C), the prolaterally curved basal apophysis of the cymbium (Fig. 24C), and the lack of a tegular furrow. Female distinguished from other Chinese mysmenids by the fleshy triangular scape with a small posterior-directed process (Figs 21D, 25F).

Description. Carapace tan, darker in head region, male with prominent sulci near the ALE (Fig. 24E) and clypeus with down turned process. Sternum dark brown with light median stripe. Legs yellow, darker on distal part of tibia. Femoral spots on legs I and II, indistinct in male. Abdomen brown with numerous tan spots, with two large and up to six small dorsal white spots, and pair of unjoined longitudinal white lines laterally, region between white stripes tan with dark brown chevrons; posterior tubercle absent (Fig. 22).

Male palp: Embolus spiral (Figs 23B, 24D). Tegular furrow absent. Cymbial base with distally curved apophysis (Fig. 24C). Cymbial groove with angled striations meeting centrally (Figs 23, 24B). Cymbial tip a single piece with groove that interacts with distal part of embolus (Fig. 24D).

Vulva: Epigynum a triangular scape, thick basally evenly narrowed distally (Fig. 21D), tip with small posteriorly-directed process (Fig. 25F). Sclerotized portion of spermatheca/copulatory duct complexes separated by about 1.5 times their width (Fig. 21E).

Male (CASENT 9022371): Total length 0.79, carapace 0.35 long, 0.35 wide, clypeus 0.10, sternum 0.23 long, 0.25 wide, coxa IV separated by 2.00 times their width. Sulcus just below anterior lateral eye. Macrosetae: Leg I: patella d1, tibia d1,

metatarsus p1; Leg II: patella d1, tibia d1, v3; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae weakly sinuous, not kinked (Fig. 24F). Metatarsal trichobothria: TmI: 0.33; TmII: 0.35; TmIII: 0.48. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of two spigots each. Spinnerets (Fig. 25A-D); posterior lateral spinnerets with flagelliform and aggregate gland spigots reduced to nubbins (Fig. 25D).

Female (CASENT 9022371): Total length 0.98, carapace 0.34 long, 0.38 wide, clypeus 0.06, sternum 0.27 long, 0.26 wide, coxa IV separated by 1.64 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.38; TmII: 0.36; TmIII: 0.37. Leg measurements: see Appendix A.

Natural History. This species builds a three-dimensional spherical web typical of the Mysmenidae (Fig. 26A).

***Mysmena goudao* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:21B7C117-C770-4C8E-B8B9-B1803E0B0FED
Figs 21F-H, 27A-E, 28-29, 97

Material Examined. Holotype: CHINA: Yunnan: Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, QiQi He, 9.9 airkm W of Gongshan, 27.715°N, 98.565°E, 2000 m, 9-14 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9029304, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9016245, CAS), 5 ♂, 12 ♀; [same data as holotype] (CASENT 9029305, HNU), 1 ♂, 15 ♀, 6 juvs; Fugong Co., Lishadi, 500 m W of Shibali, 27.16650°N, 98.77936°E, 2537 m, 18 August 2005, sifting deciduous forest litter, P. Paquin, PP-4405 (CASENT 9022510, CAS), 1 ♂, 1 juv; Gaoligongshan, Shibali forest station, 27.16636°N, 98.77667°E, 2563 m, 3-11 May 2004, good forest, pitfall traps, C. Griswold, D. Kavanaugh, CGY21 (CASENT 9020447, HNU), 1 ♂, 2 ♀; (CASENT 9020446, CAS), 1 ♂, 1 ♀, 1 juv; Gaoligongshan, 0.5 km radius of Shibali forest station, 27.16519°N, 98.77891°E, 2525 m, 1-9 May 2004, dusting webs in forest, C. Griswold, CGY25 (CASENT 9029297, CAS), 1 ♂; Gaoligongshan, 0.4 km SSE Shibali forest station, 27.16337°N, 98.78208°E, 2475 m, 5 May 2004, dusting webs in understory of good forest, C. Griswold, CGY29 (CASENT 9019872, HNU), 1 ♂, 2 ♀.

Etymology. Formed from the Chinese word for groove (gōu dào 沟道), referring to the wide tuberculate groove on the male cymbium.

Diagnosis. Male distinguished by the cymbial groove studded with tubercles (Fig. 29A). Female distinguished from most Chinese *Mysmena* by the lack of scape or other external structures to the epigynum (Fig. 29F); distinguished from *M. haban* and *M. shibali* by the presence of a spermatheca/copulatory duct complex (Fig. 21G; spermathecae simple and round to oval, distinct from lightly sclerotized copulatory ducts in *M. haban* and *M. shibali*; Figs 21I, 31B).

Description. Carapace orange, sulci absent. Sternum dusky orange. Legs orange. Femoral spots on legs I and II. Abdomen gray with four white spots on posterior; posterior tubercle absent (Fig. 27A-E).

Male palp: Embolus spiral, follows tegular groove for most of length, engages with cymbium distally (Fig. 28, 29C). Cymbium with wide groove studded with tubercles (Figs 28A, 29A). Cymbial base with lobes, no apophyses (Fig. 29B). Tip of cymbium divided into several thin terminal apophyses (Fig. 28B).

Vulva: Epigynum weakly sclerotized, without scape or any other obvious external structure (Fig. 29F); internal structures visible through cuticle (Fig. 21F). Copulatory ducts with multiple turns, atria clearly visible; region between atria with wrinkled texture (Fig. 21G). Sclerotized portion of spermatheca/copulatory duct complexes separated by more than their width.

Male (CASENT 9016245): Total length 0.71, carapace 0.40 long, 0.39 wide, clypeus 0.16, sternum 0.26 long, 0.26 wide, coxa IV separated by 1.50 times their width. Macrosetae: Leg I: patella d1, tibia d1, metatarsus p1; Leg II: patella d1, tibia d1, v3; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae gradually curved. Metatarsal trichobothria: TmI: 0.25; TmII: 0.36; TmIII: 0.35. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of two spigots each. Posterior lateral spinnerets with flagelliform and aggregate gland spigots reduced to nubbins (Fig. 29E).

Female (CASENT 9016245): Total length 0.98, carapace 0.46 long, 0.43 wide, clypeus 0.13, sternum 0.29 long, 0.29 wide, coxa IV separated by 1.80 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.26; TmII: 0.28; TmIII: 0.35. Leg measurements: see Appendix A.

Mysmena haban Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:78E5B4C0-FDEF-47B8-884B-27F4CA873F94
Figs 21I, 97

Material Examined. Holotype: CHINA: Yunnan: Gongshan Co. Dulongjiang Township, Haban Falls 0.5 airkm from Qinlangdang village along Dulong Jiang, 27.67934°N, 98.27291°E, 1265 m, 1 September 2006, forest, rocky outcrops, night, J.A. Miller, D.H. Kavanaugh, JM06090106 (CASENT 9024371, HNU), 1 ♀.

Etymology. Derived from the name of the type locality. The epithet is a noun in apposition.

Diagnosis. Distinguished from most other Chinese *Mysmena* species by the lack of a well defined scape (Fig. 21I); distinguished from *M. goudao* by having the spermathecae simple and round (Fig. 21I) rather than part of a complex with the copulatory ducts (Fig. 21G); distinguished from *M. shibali* by the separation of the spermathecae (about 1.5 times their diameter in *M. haban*, nearly three times their diameter in *M. shibali*; Fig. 31B), the path of the fertilization ducts (J-shaped in *M. haban*, sinuous in

M. shibali), and the presence of a posterior abdominal tubercle in *M. shibali* (absent in *M. haban*).

Description. Carapace brown, darker margin and through head region. Sternum dusky yellow. Legs pale yellow, darker distally. Indistinct femoral spots on legs I and II. Abdomen pale tan with pair of broken white lines laterally and posteriorly (higher posteriorly than laterally), darker ventral to white stripe and with dark anterior patch; posterior tubercle absent.

Vulva: External structures subtle. Round spermathecae separated by about 1.5 times their diameter. Copulatory ducts weakly sclerotized throughout terminating in pair of wide atria; region between atria with wrinkled texture. Fertilization ducts relatively well sclerotized, arise from posterior part of spermathecae, run mesally, spiral at tip (Fig. 21I).

Female (holotype): Total length 0.75, carapace 0.31 long, 0.31 wide, clypeus 0.05, sternum 0.22 long, 0.22 wide, coxa IV separated by 2.20 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.30; TmII: 0.33; TmIII: 0.31. Leg measurements: see Appendix A.

Male unknown.

***Mysmena shibali* Miller, Griswold & Yin, sp. n.**

urn:lsid:zoobank.org:act:42984378-6350-412D-B533-CC9A51FBCB43

Figs 27F-H, 31A-B, 94

Material Examined. Holotype: CHINA: Yunnan: Gaoligongshan, 0.5 km radius of Shibali forest station, 27.16519°N, 98.77891°E, 2525 m, 1-9 May 2004, dusting webs in forest, C. Griswold, CGY25 (CASENT 9029288, HNU), 1 ♀.

Paratype: [same data as holotype] (CASENT 9019885, SEM, CAS), 3 ♀; [same data as holotype] (CASENT 9019884, HNU), 3 ♀; Gaoligongshan, Shibali forest station, 27.16519°N, 98.77891°E, 2525 m, 1 May 2004, general collecting, C. Griswold, D. Kavanaugh, CGY20 (CASENT 9029289, CAS), 1 ♀; Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, QiQi He, 9.9 airkm W of Gongshan, 27.715°N, 98.565°E, 2000 m, 9-14 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9029317, CAS), 1 ♀.

Etymology. Named for the type locality. The epithet is a noun in apposition.

Diagnosis. Distinguished from most other Chinese *Mysmena* species by the lack of a well defined scape (Fig. 31A); distinguished from *M. goudao* by having the spermathecae simple and round (Fig. 31B) rather than part of a complex with the copulatory ducts (Fig. 21G); distinguished from *M. haban* by the separation of the spermathecae (nearly three times their diameter in *M. shibali*, about 1.5 times their diameter in *M. haban*; Fig. 21I), the path of the fertilization ducts (sinuous in *M. shibali*, J-shaped in *M. haban*), and the presence of a posterior abdominal tubercle in *M. shibali* (absent in *M. haban*).

Description. Carapace brown with lighter patches around thoracic margin. Sternum yellow with dark spots. Legs yellow, distal part of tibiae darker. Femoral spots on legs I

and II. Abdomen dark brown with numerous tan spots, with four dorsal white spots, four to six lateral white spots, and two longitudinal white lines laterally running to posterior tubercle, region between white stripes tan with dark brown chevrons (Fig. 27F-H).

Vulva: Epigynum a soft triangular process pointing posteriorly (Fig. 31A). Oval spermathecae separated by nearly 3 times their diameter (Fig. 31B). Copulatory ducts weakly sclerotized throughout. Fertilization ducts relatively well sclerotized, arise from mesal part of spermathecae, follow sinuous path running mesally and posteriorly (Fig. 31B).

Female (CASENT 9019885): Total length 0.94, carapace 0.35 long, 0.35 wide, clypeus 0.04, sternum 0.26 long, 0.24 wide, coxa IV separated by 1.67 times their width. Macrosetae: Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.36; TmII: 0.26; TmIII: 0.39. Leg measurements: see Appendix A.

Male unknown.

Genus *Simaoa* Miller, Griswold & Yin, gen. n.

urn:lsid:zoobank.org:act:8EDE8A1B-1604-40D1-89AD-B1B853E8CBF5

Type species. *Simaoa yaojia* Miller, Griswold & Yin, sp. n.

Etymology. Formed from the Chinese words for four (sì 四) and spear (máo 矛), referring to the presence of four macrosetae on the male first tibia. The gender is feminine.

Diagnosis. Male distinguished from other mysmenid genera by the presence of four macrosetae on tibia I (Fig. 34F); other genera with macrosetae on tibia I have no more than two (e.g., *Anjouanella*, *Maymena*, *Microdipoena*, and *Mysmenella*).

Female distinguished by having the spermathecae and spiraling copulatory ducts encapsulated together (Figs 31D, F, H-I), in combination with a scape that is only a small knob, or no scape present.

Description. Male with head moderately to strongly raised, with sulci below ALE (Figs 34D, 37D). Femoral spots on legs I and II, indistinct in male. Abdomen with or without posterior tubercle.

Male palp: Base of cymbium with large tooth-like apophysis (Figs 34A, 37A). Path of sperm duct in distal part of palpal bulb makes distinctive double loop (Figs 33, 36).

Vulva: Spermathecae and copulatory ducts contained within a sclerotized capsule. Copulatory ducts spiral within capsule along longitudinal axis (or obliquely so); fertilization ducts pass through copulatory duct spiral before turning mesally (Figs 31D, F, H-I).

Species. *Simaoa yaojia* sp. n., *S. kavanaugh* sp. n., *S. maku* sp. n., *S. bianjing* sp. n.

Note on circumscription: Two of four included species known only from females. The external genital anatomy of the species known only from females does not closely resemble that of species known from both sexes. However, the internal epigynal structures are very similar across all four species and circumscription is based primarily on this. The eventual discovery of the missing males may or may not support the circumscription presented here.

***Simaoa yaojia* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:4FF0908B-7461-4B1F-B3CD-7A5627972B36
Figs 20F, 30D, 31C-D, 32-34, 97

Material Examined. Holotype: CHINA: Yunnan: Lushui Co., Yaojiaping, at Pianma Road km 44.7, 25.97479°N, 98.71027°E, 2516 m, 19-20 May 2005, disturbed forest, dusting webs in understory, C. Griswold, CGY111 (CASENT 9029309, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022351, CAS), 2 ♂, 13 ♀, 2 juvs; [same data as holotype] (CASENT 9022362, CAS), 1 ♂, 6 ♀, 1 juv; [same data as holotype] (CASENT 9022363, HNU), 2 ♂, 19 ♀, 3 juvs; [same data as holotype] (CASENT 9029349, PV 0841-0864, CAS), 1 ♂, 1 ♀.

Etymology. The epithet is an abbreviated form of the collection locality and takes the form of a noun in apposition.

Diagnosis. Distinguished from *S. kavanaugh* by the palpal tibia, which has a dorsal tooth-like apophysis (Fig. 34C) and is relatively long (Fig. 33B; tooth-like apophysis absent, tibia relatively short in *S. kavanaugh*, Fig. 36B), and by the embolus, which makes a half turn in *S. yaojia* (Fig. 33B), more than a full turn in *S. kavanaugh* (Fig. 36A). Male carapace more strongly raised in *S. kavanaugh* (compare Figs 32A and 35A). Female distinguished from other *Simaoa* species except *S. kavanaugh* by the presence of two transverse lobes of the epigynum, a raised anterior lobe and a low posterior lobe along epigastric furrow (Figs 30D, 37F); distinguished from *S. kavanaugh* by the relatively narrower anterior lobe of epigynum fitting in the space between the spermathecae (Fig. 31C-D; overlapping spermathecae in *S. kavanaugh*; Fig. 31E-F) and the angle of the copulatory ducts, longitudinal in *S. yaojia* (Fig. 31D), oblique in *S. kavanaugh* (Fig. 31F).

Description. Carapace brown, lighter in thoracic region, male with head region moderately raised, sulci below ALE. Sternum pale with indistinct dark markings. Legs yellow, darker on distal part of tibia. Femoral spots on legs I and II, indistinct in male. Abdomen brown with numerous tan spots, with two large and up to six small dorsal white spots, and two longitudinal white lines laterally running to posterior tubercle, region between white stripes tan with dark brown chevrons (Fig. 32).

Male palp: Tibia with small dorsal tooth-like apophysis (Fig. 34C). Embolus makes half turn (Figs 33B, 34B).

Vulva: Epigynum with two parallel transverse lobes, anterior one raised and longer, posterior one lower, set along epigastric furrow (Fig. 30D). Anterior transverse lobe as wide as space between spermathecae (Fig. 31D). Spermathecae round with copulatory duct spiraling posteriorly through thick sclerotized capsule. Fertilization ducts run through center of copulatory duct spiral, curve mesally near tips.

Male (CASENT 9022351): Total length 0.71, carapace 0.35 long, 0.34 wide, clypeus 0.14, sternum 0.24 long, 0.24 wide, coxa IV separated by 1.91 times their width. Macrosetae: Leg I: patella d1, tibia d1, p4, metatarsus p1; Leg II: patella d1, tibia d1, v3; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae kinked near center (Fig. 34E). Metatarsal trichobothria: TmI: 0.27; TmII: 0.33;

TmIII: 0.42. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of two spigots each.

Female (CASENT 9022351): Total length 1.03, carapace 0.35 long, 0.34 wide, clypeus 0.07, sternum 0.27 long, 0.24 wide, coxa IV separated by 1.69 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.33; TmII: 0.34; TmIII: 0.36. Leg measurements: see Appendix A.

Natural History. This species builds a three-dimensional spherical web typical of the Mysmenidae (Fig. 20F).

***Simaoa kavanaugh* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:FB4E5F5F-C54A-45B9-B37D-A699C7A904AC
Figs 20B-E, 31E-F, 35-37, 97

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km 23.5, 24.82888°N, 98.76001°E, 2020 m, 27-28 May 2005, good primary broadleaf forest, dusting webs in understory, C. Griswold, CGY128 (CASENT 9029306, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022374, CAS), 4 ♂, 10 ♀; [same data as holotype] (CASENT 9022373, HNU), 2 ♂, 10 ♀; [same data as holotype] (CASENT 9029343, with prey, CAS), 1 ♀; Longyang Co., Mangkuan Township, Zaotang He at Baihualing village, 25.30450°N, 98.80059°E, 1635 m, 2 June 2005, good subtropical broadleaf forest, dusting webs in understory, C. Griswold, CGY135 (CASENT 9022399, HNU), 1 ♂, 2 ♀; [same data] (CASENT 9022400, CAS), 1 ♂, 2 ♀; [same data] (CASENT 9029351, CAS), 1 ♀, 1 juv; Longyang Co., Bawan Township, Sancha He, Luoshuidong area, 24.92597°N, 98.75806°E, 2300 m, 3 June 2005, good broadleaf forest, night collecting, C. Griswold, CGY137 (CASENT 9022384, HNU), 5 ♀; [same data] (CASENT 9022383, CAS), 5 ♀; [same data] (CASENT 9022385, HNU), 5 ♀; Longyang Co., Bawan Township, forest below Dasheyao Forestry Station in Hunan He valley, 24.92597°N, 98.75806°E, 2272 m, 3 June 2005, disturbed forest, beating understory vegetation, C. Griswold, CGY136 (CASENT 9022392, HNU), 3 ♀; Longyang Co., Bawan Dist., Nankang Yakou, 24.83178°N, 98.76472°E, 2180 m, 22-25 May 2005, understory of good forest on E-facing slope, dusting webs near forest floor, C. Griswold, CGY115 (CASENT 9022377, CAS), 1 ♂, 3 ♀; [same data] (CASENT 9022378, HNU), 3 ♀, 1 juv; [same data] (CASENT 9029345, CAS), 1 ♀; [same data] (CASENT 9029346, CAS), 1 ♀; Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km23.5, 24.82888°N, 98.76001°E, 2020 m, 26 May 2005, good primary broadleaf forest, dusting webs in understory, C. Griswold, CGY126 (CASENT 9022349, CAS), 2 ♂, 9 ♀, 8 juvs; [same data] (CASENT 9022368, HNU), 2 ♂, 9 ♀, 8 juvs; [same data] (CASENT 9022348, HNU), 1 ♂, 2 ♀; [same locality] 28 May 2005, good primary broadleaf forest, night collecting, C. Griswold, D. Kavanaugh, CGY129 (CASENT

9022353, CAS), 1 ♂, 1 ♀; Baoshan Prefecture, pass over Gaoligongshan, Luoshuidong, 28 air km E Teng Chong, 24.95°N, 98.75°E, 2300 m, 26-31 October 1998, native forest, C. Griswold, D. Kavanaugh, C.L. Long (CASENT 9029307, CAS), 2 ♂, 10 ♀, 57 juvs; Baoshan Prefecture, pass over Gaoligongshan, Nankang, 36 air km SE Teng Chong, 24.83333°N, 98.78333°E, 2100 m, 4-7 November 1998, native forest, C. Griswold, D. Kavanaugh, C.L. Long (CASENT 9029308, HNU), 3 ♀, 5 juvs.

Etymology. Named in honor of David Kavanaugh for his leadership on the Gaoligongshan inventory project. The epithet is a noun in apposition.

Diagnosis. Distinguished from *S. yaojia* by the palpal tibia, which lacks a dorsal tooth-like apophysis (Fig. 37C) and is relatively short (Fig. 36B; tooth-like apophysis present, tibia relatively long in *S. yaojia*, Fig. 33B), and by the embolus, which makes more than a full turn in *S. kavanaugh* (Fig. 36A), half a turn in *S. yaojia* (Fig. 33B). Male carapace more strongly raised in *S. kavanaugh* (compare Figs 32A and 35A). Female distinguished from other *Simaoa* species except *S. yaojia* by the presence of two transverse lobes of the epigynum, a raised anterior lobe and a low posterior lobe along epigastric furrow (Figs 30D, 37F); distinguished from *S. yaojia* by the relatively wider anterior lobe of epigynum overlapping with the spermathecae (Fig. 31E-F; fitting in the space between the spermathecae in *S. yaojia*; Fig. 31C-D) and the angle of the copulatory ducts, oblique in *S. kavanaugh* (Fig. 31F), longitudinal in *S. yaojia* (Fig. 31D).

Description. Carapace brown, lighter in thoracic region, male with head region strongly raised, sulci below ALE. Sternum pale with indistinct dark markings. Legs yellow, darker on distal part of tibia. Femoral spots on legs I and II, indistinct in male. Abdomen brown with numerous tan spots, with two large and up to six small dorsal white spots, and two longitudinal white lines laterally running to posterior tubercle, region between white stripes tan with dark brown chevrons (Fig. 35).

Male palp: Tibia without tooth-like apophysis. Base of cymbium with large tooth-like apophysis (Fig. 37A). Embolus makes more than full spiral turn (Fig. 36A).

Vulva: Epigynum with two parallel transverse lobes, anterior one raised, posterior one lower, set along epigastric furrow (Fig. 37F). Anterior transverse lobe wider than space between spermathecae (Fig. 31F). Spermathecae round with copulatory duct spiraling posteriorly and mesally through thick sclerotized capsule. Fertilization ducts run through center of copulatory duct spiral, curve mesally near tips.

Male (CASENT 9022374): Total length 0.81, carapace 0.22 long, 0.23 wide, clypeus 0.19, sternum 0.24 long, 0.24 wide, coxa IV separated by 2.00 times their width. Leg I: patella d1, tibia d1, p4, metatarsus p1; Leg II: patella d1, tibia d1, v3; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae kinked near center. Metatarsal trichobothria: TmI: 0.35; TmII: 0.36; TmIII: 0.35. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of two spigots each.

Female (CASENT 9022374): Total length 1.03, carapace 0.38 long, 0.36 wide, clypeus 0.11, sternum 0.27 long, 0.24 wide, coxa IV separated by 1.64 times their width. Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.35; TmII: 0.36; TmIII: 0.35. Leg measurements: see Appendix A.

Natural History. This species builds a three-dimensional spherical web typical of the Mysmenidae (Fig. 20B-E).

***Simaoa maku* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:1C57B421-A9D8-454C-9292-2B182B6A42D2
Figs 31G-H, 98

Material Examined. Holotype: CHINA: Yunnan: Gongshan Co. Dulongjiang Township, Maku ridge, 27.67509°N, 98.30160°E, 1950 m, 30 August 2006, forest, rocky outcrops, night, J.A. Miller, D.H. Kavanaugh, JM06083001 (CASENT 9024429, HNU), 1 ♀.

Etymology. The epithet is derived from the type locality.

Diagnosis. Distinguished from *S. yaojia* and *S. kavanaugh* by the presence of a small posteriorly projecting process on the epigynum and the lack of a transverse anterior lobe (Fig. 31H); distinguished from *S. bianjing* by the lack of a posterior tubercle on the abdomen and by the path of the fertilization ducts, which run towards each other after emerging from the copulatory duct spiral (Fig. 31H; run obliquely anteriorly in *S. bianjing*; Fig. 31I).

Description. Carapace pale thoracic region, brown head region. Sternum brown. Legs orange, darker patellae and distally on femora, tibiae, metatarsi, and tarsi. Femoral spot on leg I. Abdomen dark gray with pair of white patches dorsally and pair of unjoined longitudinal white lines laterally; posterior tubercle absent.

Vulva: Epigynum with a small process pointing posteriorly (Fig. 31G). Copulatory ducts coil around fertilization ducts in nearly longitudinal axis. Fertilization ducts run toward each other after emerging from copulatory duct region (Fig. 31H).

Female (holotype): Total length 0.87, carapace 0.35 long, 0.33 wide, clypeus 0.08, sternum 0.24 long, 0.23 wide, coxa IV separated by 1.69 times their width. Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.32; TmII: 0.33; TmIII: 0.36. Leg measurements: see Appendix A.

Male unknown.

***Simaoa bianjing* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:ECF8A9B5-A4EC-41E6-9E7E-9CB26B2E4574
Figs 31I, 98

Material Examined. Holotype: CHINA: Yunnan: Gongshan Co. Dulongjiang Township, Haban Falls 0.5 airkm from Qinlangdang village along Dulong Jiang, 27.67934°N, 98.27291°E, 1265 m, 1 September 2006, forest, rocky outcrops, night, J.A. Miller, D.H. Kavanaugh, JM06090106 (CASENT 9024372, HNU), 1 ♀.

Etymology. Formed from the Chinese word for border (biān jìng 边境), referring to the collection locality on the China-Burma (Myanmar) border.

Diagnosis. Distinguished from *S. yaojia* and *S. kavanaugh* by the presence of a small posteriorly projecting process on the epigynum and the lack of a transverse anterior lobe (Fig. 31I); distinguished from *S. maku* by presence of a posterior tubercle on the abdomen and by the path of the fertilization ducts, which run obliquely anteriorly after emerging from the copulatory duct spiral (Fig. 31I; run towards each other in *S. bianjing*; Fig. 31H).

Description. Carapace dark brown, lighter in thoracic region. Sternum pale yellow with two brown patches. Legs tan, patellae and distal parts of femora, tibiae, and metatarsi dark brown. Femoral spots on legs I and II. Abdomen dark gray with series of white and tan patches, with pair of unjoined white lines running from spinnerets to prominent posterior tubercle, region between white lines tan with brown chevrons.

Vulva: Epigynum with a small process pointing posteriorly. Copulatory ducts coil around fertilization ducts in nearly longitudinal axis. Fertilization ducts curve obliquely anteriorly after emerging from copulatory duct region (Fig. 31I).

Female (holotype): Total length 0.95, carapace 0.35 long, 0.32 wide, clypeus 0.07, sternum 0.24 long, 0.23 wide, coxa IV separated by 1.75 times their width. Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.34; TmII: 0.31; TmIII: 0.35. Leg measurements: see Appendix A.

Male unknown.

Genus *Gaoligonga* Miller, Griswold & Yin, gen. n.

urn:lsid:zoobank.org:act:846BBC83-23A3-4807-8C81-693FC2C3D278

Type species. *Gaoligonga changya* Miller, Griswold & Yin, sp. n.

Etymology. Named for the Gaoligong mountain range. The gender is feminine.

Diagnosis. Male distinguished by characteristics of the palp: cymbium almost completely envelopes the palpal bulp, cymbial base in prolateral view nearly touches opposite cymbial margin (Figs 40A, 46A); retrolateral face of cymbium with a basal keel, a median keel, and a distal lobe separated from the median keel by an invagination (Figs 40B, 46B); embolus spiral, tip variable. Male further distinguished from most other mysmenids by the presence of two strong setae near the base of each chelicera, but this is much more conspicuous in *G. changya* (Fig. 38A) than *G. zhusun* (Fig. 46D) and some other mysmenids described from the region also have strong cheliceral setae (e.g., *Mysmena rostella* Lin & Li, 2008, *M. arcilongus* Lin & Li, 2008 , *M. taiwanica* Ono, 2006).

Female distinguished by the absence of femoral spots or a posterior abdominal tubercle in combination with a raised, ridged, central knob of the epigynum (Figs 41A, 43E, 47D).

Description. Femoral spots absent. Abdomen without posterior tubercle. Male with head moderately to strongly raised (Figs 40E, 46E), sulci absent, tibia I without prolateral macrosetae.

Male palp with a cymbium that almost completely envelopes the palpal bulp, cymbial base in prolateral view nearly touches opposite cymbial margin (Figs 40A, 46A);

retrolateral cymbial face with a basal keel, a median keel, and a distal lobe separated from the median keel by an invagination (Figs 40B, 46B). Embolus spiral, tip variable.

Vulva: Epigynum a weakly (Fig. 43D) or strongly (Fig. 43A) sclerotized plate, without scape, with a raised, ridged, central knob (Figs 41A, 43E, 47D).

Species. *Gaoligonga changya*, sp. n., *G. zhusun*, sp. n.

Gaoligonga changya Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:591AC0CB-500B-495B-A744-A3C9F5FA1CFB
Figs 26B-D, 38-42, 43A-C, 98

Material Examined. Holotype: CHINA: Yunnan: Gaoligongshan, Shibali forest station, 27.16636°N, 98.77667°E, 2563 m, 3-11 May 2004, good forest, pitfall traps, C. Griswold, D. Kavanaugh, CGY21 (CASENT 9020452, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9020449, CAS), 3 ♂, 6 ♀; [same data as holotype] (CASENT 9020454, HNU), 2 ♂, 9 ♀, 12 juvs; [same data as holotype] (CASENT 9020448, HNU), 3 ♂, 6 ♀; [same data as holotype] (CASENT 9020450, HNU), 3 ♂, 6 ♀; [same data as holotype] (CASENT 9020451, CAS), 3 ♂, 6 ♀; [same data as holotype] (CASENT 9020453, CAS), 1 ♂, 8 ♀; Gaoligongshan, Shibali forest station, 27.16519°N, 98.77891°E, 2525 m, 1 May 2004, general collecting, C. Griswold, D. Kavanaugh, CGY20 (CASENT 9011592, HNU), 1 ♀; Gaoligongshan, 0.5 km radius of Shibali forest station, 27.16519°N, 98.77891°E, 2525 m, 1-9 May 2004, dusting webs in forest, C. Griswold, CGY25 (CASENT 9020651, CAS), 1 ♀; [same data] (CASENT 9019879, CAS), 2 ♂, 8 ♀; [same data] (CASENT 9020653, CAS), 4 ♀; [same data] (CASENT 9020655, HNU), 2 ♀, 3 juvs; [same data] (CASENT 9019878, HNU), 2 ♂, 8 ♀; [same data] (CASENT 9019880, CAS), 1 ♂, 4 ♀; [same data] (CASENT 9019881, HNU), 1 ♂, 4 ♀; [same data] (CASENT 9019883, HNU), 4 ♀, 15 juvs; [same data] (CASENT 9020652, HNU), 4 ♀; [same data] (CASENT 9019882, CAS), 4 ♀, 12 juvs; [same data] (CASENT 9020654, CAS), 2 ♀, 3 juvs; [same data] (CASENT 9024141, HNU), 1 ♂, 7 ♀, 2 juvs; [same data] (CASENT 9024142, HNU), 4 ♀, 1 juv; Gaoligongshan, 0.4 km SSE Shibali forest station, 27.16337°N, 98.78208°E, 2475 m, 5 May 2004, dusting webs in understory of good forest, C. Griswold, CGY29 (CASENT 9019870, HNU), 8 ♀, 8 juvs; [same data] (CASENT 9019871, CAS), 8 ♀, 8 juvs; [same data] (CASENT 9019868, HNU), 1 ♂, 4 ♀; [same data] (CASENT 9019865, HNU), 2 ♂, 8 ♀; [same data] (CASENT 9019866, CAS), 2 ♂, 8 ♀; [same data] (CASENT 9019869, CAS), 1 ♂, 4 ♀; [same data] (CASENT 9019867, HNU), 1 ♂, 4 ♀; [same data] (CASENT 9024140, HNU), 1 ♂, 8 ♀, 2 juvs; Fugong Co., Lishadi, 500 m W of Shibali, 27.16650°N, 98.77936°E, 2537 m, 4 August 2005, deciduous forest litter, P. Paquin, PP-2005 (CASENT 9022573, HNU), 1 ♀; [same locality] 18 August 2005, sifting deciduous forest litter, P. Paquin, PP-4405 (CASENT 9022509, CAS), 1 ♂, 1 ♀, 1 juv; Fugong Co., Lishadi, 3 km W of Shibali (first waterfall), 27.17312°N, 98.76764°E, 3019 m, 9 August 2005, scree slope and moist ravine with rocky cliffs, P. Paquin, D. Kavanaugh, PP-2905 (CASENT 9022593,

HNU), 1 ♀; Shibali forest station, 27.16636°N, 98.77667°E, 2563 m, 4 May 2004, good forest, sifting leaf litter, C. Griswold, D. Kavanaugh, CGY28 (CASENT 9020059, CAS), 2 ♀; [same data] (CASENT 9020062, HNU), 1 ♀; [same data] (CASENT 9020061, HNU), 1 ♀; [same data] (CASENT 9020060, HNU), 2 ♀; Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, QiQi He, 9.9 airkm W of Gongshan, 27.715°N, 98.565°E, 2000 m, 9-14 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9016244, CAS), 1 ♂, 20 ♀, 4 juvs; [same data] (CASENT 9016241, CAS), 1 ♀; [same data] (CASENT 9016242, CAS), 1 ♀; [same data] (CASENT 9016240, CAS), 1 ♀; Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, No. 12 Bridge Camp area, 16.3 airkm W of Gongshan, 27.715°N, 98.502°E, 2775 m, 15-19 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9016250, CAS), 1 ♀; [same data] (CASENT 9016248, CAS), 1 ♀; Gongshan Co., Bingzhongluo Township, Guocai He at Fucai, 28.00858°N, 98.51894°E , 2800 m, 16 August 2006, forest, rocky outcrops, night, J.A. Miller, JM06081602 (CASENT 9024314, CAS), 1 ♀; Gongshan Co., Bingzhongluo Township, Guocai He at Fucai, 28.00858°N, 98.51894°E, 2800 m, 23 August 2006, forest, rocky outcrops, night, J.A. Miller, D.H. Kavanaugh, JM06082301 (CASENT 9024439, HNU), 2 ♀; [same data] (CASENT 9024311, CAS), 1 ♀.

Etymology. Formed from the Chinese word for tusk (cháng yá 长牙), referring to the prominent macrosetae on the front of the male chelicerae.

Diagnosis. Male distinguished by the presence of two strong macrosetae near the base of each chelicerae (Figs 38A, 40E-F); further distinguished by the shape of the embolic tip (tapered in *G. changya*, Fig. 40C; expanded in *G. zhusun*, Fig. 46B) and by the presence of a cymbial tooth (Fig. 40B; absent in *G. zhusun*). Female distinguished by the well sclerotized ventral plate of the epigynum with ridges radiating out from a raised knob (Figs 41A, 43A), reniform spermathecae, and sinuous ducts (Fig. 43B; epigynum and raised knob less strongly sclerotized in *G. zhusun*, spermathecae not strongly differentiated from nearly longitudinal ducts; Figs 43D-E, 47D).

Description. Carapace brown with darker patches in thoracic and head regions, male covered with elongate, flat tubercles, head region raised, sulci absent (Fig. 40E). Male chelicerae each with a pair of very strong macrosetae rooted near the base (Fig. 38A, 40E-F). Labrum weakly sclerotized; labral tongue present, base not produced into a labral spur (Fig. 41E-F). Sternum yellow with broad dusky margin. Legs yellow with dark rings distally on tibiae and metatarsi. Femoral spots absent. Abdomen brown with tan and white spots; posterior tubercle absent (Fig. 38).

Male palp: Embolus spiral, follows margin of cymbium to tip, embolus tip wrapped by distal part of cymbium (Fig. 40C). Cymbium with a tooth-like process on retrolateral part (Fig. 40B).

Vulva: Epigynum with semicircular ridges radiating out from raised knob (Fig. 41A). Ventral plate heavily sclerotized, red (Fig. 43A). Spermathecae and ducts all heavily sclerotized (Fig. 43B). Spermathecae reniform. Copulatory ducts thick, follow simple curved path. Fertilization ducts run posteriorly and mesally, then turn anteriorly near tips.

Male (CASENT 9022509): Total length 0.83, carapace 0.38 long, 0.42 wide, clypeus 0.24, sternum 0.28 long, 0.26 wide, coxa IV separated by 1.64 times their width. Macrosetae: Leg I: patella d1, tibia d1, metatarsus p1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae kinked beyond center, region beyond macroseta excavated prolaterally (Fig. 40D). Metatarsal trichobothria: TmI: 0.25; TmII: 0.26; TmIII: 0.35. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of three spigots each (Fig. 41C). Posterior lateral spinnerets with flagelliform and aggregate gland spigots reduced to nubbins (Fig. 42F).

Female (CASENT 9016244): Total length 1.13, carapace 0.45 long, 0.45 wide, clypeus 0.10, sternum 0.30 long, 0.30 wide, coxa IV separated by 1.75 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.27; TmII: 0.28; TmIII: 0.34. Leg measurements: see Appendix A. Spinnerets (Fig. 42A-D).

Natural History. This species builds a three-dimensional spherical web typical of the Mysmenidae (Fig. 26B-D; see also page 12).

***Gaoligonga zhusun* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:EE37EDDC-1418-49FB-8D98-BF0589A0FB5B
Figs 43D-E, 44-47, 98

Material Examined. Holotype: CHINA: Yunnan: Fugong Co., Shilajia village on N fork, Yamu He, Gaoligongshan, 27.13440°N, 98.82625°E, 1792 m, 24 April 2004, moist steep stream banks, C. Griswold, CGY09 (CASENT 9020722, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9020723, CAS), 1 ♂, 4 ♀; [same data as holotype] (CASENT 9020718, CAS), 1 ♀; [same data as holotype] (CASENT 9020724, CAS), 1 ♂, 2 ♀; [same data as holotype] (CASENT 9020726, HNU), 2 ♀; [same data as holotype] (CASENT 9020727, HNU), 2 ♀, 3 juvs; [same data as holotype] (CASENT 9020725, CAS), 2 ♀; [same data as holotype] (CASENT 9020728, CAS), 1 ♀, 2 juvs; [same data as holotype] (CASENT 9029352, CAS), 5 ♀; Fugong Co., S Fork, Yamu He, 1.51 km 150° SW of confluence [with N Fork], Gaoligongshan, 27.11905°N, 98.83108°E, 1723 m, 26 April 2004, moist shaded embankments, C. Griswold, CGY13 (CASENT 9020755, CAS), 4 ♀; [same data] (CASENT 9020754, HNU), 1 ♂, 1 ♀; [same data] (CASENT 9020758, HNU), 4 ♀; [same data] (CASENT 9020757, CAS), 4 ♀; [same data] (CASENT 9020760, HNU), 2 ♀, 4 juvs; [same data] (CASENT 9020756, HNU), 4 ♀; [same data] (CASENT 9020759, CAS), 2 ♀, 3 juvs; [same data] (CASENT 9029354, CAS), 9 ♀, 1 juv; Gaoligongshan, 10 rd km W NuJiang on Shibali Rd., N fork, Yamu He, 27.13795°N, 98.82240°E, 1850 m, 25 April 2004, moist earthen embankments, C. Griswold, CGY11 (CASENT 9020739, HNU), 1 ♀, 4 juvs; [same data] (CASENT 9020738, HNU), 2 ♀; [same data] (CASENT 9029290, CAS), 2 ♀.

Etymology. Formed from the Chinese words for bamboo shoot (zhú sǔn 竹笋), referring to the macrosetae on the front of the male chelicerae in *Gaoligonga zhusun* that are much smaller than those in *G. changya*, the other species in this genus.

Diagnosis. Male distinguished by the much weaker pair of macrosetae near the base of each chelicerae (Fig. 46D) compared to *G. changya* (Figs 38A, 40E-F); further distinguished by the shape of the embolic tip (expanded in *G. zhusun*, Fig. 46B; tapered in *G. changya*, Fig. 40C) and by the lack of a cymbial tooth (present in *G. changya*, Fig. 40B). Female distinguished by the nearly longigudinal spermatheca/copulatory duct complex (Fig. 43E; *G. changya* has spermathecae distinct from sinuous copulatory ducts, Fig. 43B); further distinguished by the well sclerotized ventral plate of the epigynum in *G. changya* (Fig. 43A), less strongly sclerotized in *G. zhusun* (Fig. 43D).

Description. Carapace yellow to brown, male head region moderately raised, sulci absent (Fig. 46E). Male chelicerae with four moderately strong setae rooted near the base (Fig. 46D). Sternum dark brown with light median stripe. Legs yellow with dark rings distally on tibiae and metatarsi. Femoral spots absent. Abdomen brown with numerous tan spots, with two large and up to six small dorsal white spots, and pair of unjoined longitudinal white lines laterally; posterior tubercle absent (Fig. 44).

Male palp: Embolus spiral, tip widened and membranous, not wrapped by distal part of cymbium (Figs 45B, 46B). Tooth-like process on retrolateral part absent from cymbium.

Vulva: Epigynum with weakly sclerotized, raised, ridged central knob (Figs 43D, 47D). Spermathecae and copulatory ducts not clearly differentiated, form nearly longitudinal complex (Fig. 43E). Fertilization ducts emerge from posterior part, spiral mesally.

Male (CASENT 9020723): Total length 0.67, carapace 0.31 long, 0.31 wide, clypeus 0.15, sternum 0.22 long, 0.22 wide, coxa IV separated by 2.40 times their width. Macrosetae: Leg I: patella d1, tibia d1, metatarsus p1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae nearly straight, only slightly kinked near center, metatarsus not excavated prolaterally (Fig. 46F). Metatarsal trichobothria: TmI: 0.22; TmII: 0.29; TmIII: 0.31. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of two to three spigots each (Fig. 47E).

Female (CASENT 9020723): Total length 0.93, carapace 0.38 long, 0.38 wide, clypeus 0.09, sternum 0.26 long, 0.25 wide, coxa IV separated by 2.00 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.26; TmII: 0.31; TmIII: 0.34. Leg measurements: see Appendix A. Spinnerets (Fig. 47A-C).

Genus *Mosu* Miller, Griswold & Yin, gen. n.

urn:lsid:zoobank.org:act:4EC80790-32D9-47C6-A5CC-8AB4613A2D28

Type species. *Mosu nujiang* Miller, Griswold & Yin, sp. n.

Etymology. Named for the Mosu people, a traditionally matriarchal ethnic minority in Yunnan Province. The gender is masculine.

Diagnosis. Female distinguished by the internal structure of the vulva, especially the round, sclerotized spermathecae with sclerotized fertilization ducts and the copulatory duct membranous and convoluted for most of its length, sclerotized at end of path near spermathecae (Fig. 43G, I); male unknown.

Description. Femoral spots present on legs I and II. Abdomen with or without posterior tubercle.

Vulva: Epigynum with bulbous, sclerotized spermathecae, short section of copulatory ducts near spermathecae sclerotized, rest of copulatory ducts membranous, convoluted; path occupies area both anterior and posterior of spermathecae. Fertilization ducts sclerotized, short, arise from mesal part of spermathecae and run more or less mesally (Fig. 43G, I). Ventral plate with a rounded lobe projecting posteriorly, with a small sclerotized process at apex (Fig. 43F, H).

Species. *Mosu nujiang* sp. n., *M. huogou* sp. n. *Mysmena zhengi* Lin and Li, 2008 (which is known from the male) may also belong to this genus.

Mosu nujiang Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:354C0C81-05C6-4394-A50B-2751253C09B6

Figs 43F-G, 100

Material Examined. Holotype: CHINA: Yunnan: Fugong Co., Pee He, 40 km S Shangpa, SW of R. , 26.54323°N, 98.89837°E, 1153 m, 23 August 2005, sifting bamboo litter at cliff base, P. Paquin, PP-4905 (CASENT 9020484, HNU), 1 ♀.

Paratype: [same data as holotype] (CASENT 9020485, CAS), 1 ♀;[same data as holotype] (CASENT 9020483, HNU), 1 ♀, 2 juvs; Fugong Co., Lishadi, 5 km N Shangpa (Fungong), SW of river, 26.96025°N, 98.86606°E, 1247 m, 26 August 2005, sifting deciduous litter at base of rock cliffs, P. Paquin, PP-5305 (CASENT 9022532, CAS), 1 ♀, 1 juv; Fugong Co., 4.5 km N Aludi Village, 22.1 km N Fugong, at stream entering NuJiang, 26.10829°N, 98.87162°E, 1263 m, 22 April 2004, C. Griswold, CGY05 (CASENT 9020715, CAS), 1 ♀.

Etymology. Named for the Nujiang or Nu River, also known as the Saalween. This species was never found far from this major river. The epithet is a noun in apposition.

Diagnosis. Distinguished from *M. huogou* by the shape of the spermathecae, bulbous in *M. nujiang* (Fig. 43G), transversely ovoid in *M. huogou* (Fig. 43I), by the contact between the membranous copulatory ducts in the posteromedial region (Fig. 43G; separated in *M. huogou*, Fig. 43I), and by the presence of a posterior abdominal tubercle in *M. nujiang*, absent in *M. huogou*.

Description. Carapace tan with dusky markings. Sternum tan with three dark arks, two anterolaterally, one posteriorly. Legs tan, darker distally on tibiae, metatarsi, and tarsi. Abdomen medium gray with tan and white spots, with chevron pattern between posterior tubercle and spinnerets.

Vulva: Spermathecae bulbous, copulatory duct adjacent to spermathecae as sclerotized as spermathecae. Fertilization ducts run anteromesally. Membranous copulatory ducts in posteriomedian region touching (Fig. 43G).

Female (CASENT 9022532): Total length 0.95, carapace 0.37 long, 0.36 wide, clypeus 0.08, sternum 0.24 long, 0.25 wide, coxa IV separated by 2.17 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.31; TmII: 0.29; TmIII: 0.36. Leg measurements: see Appendix A.

Male unknown.

***Mosu huogou* Miller, Griswold & Yin, sp. n.**

urn:lsid:zoobank.org:act:045120B5-85D4-4A79-8B2F-26FE9B340702

Figs 43H-I, 96

Material Examined. Holotype: CHINA: Yunnan: Gongshan Co. Dulongjiang Township, Haban Falls 0.5 airkm from Qinlangdang village along Dulong Jiang, 27.67934°N, 98.27291°E, 1265 m, 1 September 2006, subtropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, D.H. Kavanaugh, JM06090105 (CASENT 9024389, HNU), 1 ♀.

Etymology. Formed from the Chinese words for fire (huǒ 火) and dog (gǒu 狗), referring to the element and animal of the Chinese zodiac when this species was collected.

Diagnosis. Distinguished from *M. nujiang* by the shape of the spermathecae, transversely ovoid in *M. huogou* (Fig. 43I), bulbous in *M. nujiang* (Fig. 43G), by the separation of the membranous copulatory ducts in the posteromedial region (Fig. 43I; justaposed in *M. nujiang*, Fig. 43G), and by the presence of a posterior abdominal tubercle in *M. nujiang*, absent in *M. huogou*.

Description. Carapace brown. Sternum dark gray with lighter patches down midline and anterolaterally. Legs light brown, darker distally on tibiae, metatarsi, and tarsi. Abdomen dark gray with tan and white spots; posterior tubercle absent.

Vulva: Spermathecae transversely ovoid, copulatory duct adjacent to spermathecae less strongly sclerotized than spermathecae. Fertilization ducts run posteromesally then turn anteriorly. Membranous copulatory ducts in posteriomedian region separated (Fig. 43I).

Female (holotype): Total length 0.92, carapace 0.44 long, 0.39 wide, clypeus 0.09, sternum 0.26 long, 0.27 wide, coxa IV separated by 2.08 times their width. Macrosetae: Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.31; TmII: 0.31; TmIII: 0.33. Leg measurements: see Appendix A.

Male unknown.

Genus *Chanea* Miller, Griswold & Yin, gen. n.
urn:lsid:zoobank.org:act:E6C9BD88-D0C8-4915-9C4C-EC945E2F0F99

Type species. *Chanea suukyii* Miller, Griswold & Yin, sp. n.

Etymology. Derived from the Chinese word for coil (chán 缠). The gender is feminine.

Diagnosis. Male distinguished from other mysmenids by the long coiled embolus (Figs 49A, 51B), the entire distal part of the cymbium (Fig. 49A), the widely spaced anterior median eyes, and pair of macrosetae on the clypeus (Fig. 52B). Female distinguished by the long copulatory ducts coiled around the fertilization ducts (Fig. 49C).

Species. *Chanea suukyii*, sp. n.

***Chanea suukyii* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:79CD9642-4350-4220-8EF8-943D8A561187
Figs 48-49, 50A-C, 51-52, 100

Material Examined. Holotype: CHINA: Yunnan: Gongshan Co. Dulongjiang Township, Maku forest, 27.68847°N, 98.30065°E, 1870 m, 3 September 2006, subtropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, JM06090301 (CASENT 9024342, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9029316, HNU), 5 ♀; Gongshan Co. Dulongjiang Township, along trail from Maku Yakou to Qinlangdang village, 27.68336°N, 98.28869°E, 1550 m, 2 September 2006, forest, rocky outcrops, night, J.A. Miller, J. Wang, JM06090201 (CASENT 9024403, CAS), 2 ♀, 1 juv; Gongshan Co. Dulongjiang Township, Haban Falls 0.5 airkm from Qinlangdang village along Dulong Jiang, 27.67934°N, 98.27291°E, 1265 m, 1 September 2006, subtropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, D.H. Kavanaugh, JM06090105 (CASENT 9024354, CAS), 1 ♀; Gongshan Co. Dulongjiang Township, Maku ridge, 27.67446°N, 98.30083°E, 2000 m, 29 August 2006, subtropical evergreen broadleaf forest, leaf litter, J.A. Miller, D.H. Kavanaugh, JM06082902 (CASENT 9024317, CAS), 2 ♀, 1 juv; [same locality] 29 August 2006, subtropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, D.H. Kavanaugh, JM06082904 (CASENT 9024332, CAS), 2 ♂, 8 ♀, 2 juvs; [same locality] 29 August 2006, subtropical evergreen broadleaf forest, sifting leaf litter, J.A. Miller, D.H. Kavanaugh, JM06082904 (CASENT 9029315, HNU), 9 ♀, 1 juv;

Etymology. Patronymic in honor of Nobel Peace Prize laureate Aung San Suu Kyi.

Diagnosis. Monotypic genus; see diagnosis for genus.

Description. Carapace tan, male clypeus with pair of macrosetae (Fig. 52B; absent in female, Fig. 52A); AME separated by more than one diameter in male, less than one diameter in female. Sternum brown. Legs tan. Femoral spot on leg I. Abdomen tan (Fig. 48).

Male palp: Cymbium simple, envelopes only ventral face of palpal bulb; tip of cymbium a single piece, without grooves or lobes (Fig. 49A-B). Embolus coil makes ca.10 turns (Fig. 51B). Expanded palp reveals long basal haematodocha permitting bulb to extend far from cymbium (Fig. 50C).

Vulva: Epigynum unsclerotized with only a short fleshy projection (Fig. 50A, 52C). Spermathecae small and round, set far anterior from epigastric furrow (Fig. 50B). Copulatory ducts make many turns around fertilization ducts (fig. 49C).

Male (CASENT 9024332): Total length 0.63, carapace 0.33 long, 0.29 wide, clypeus 0.12, sternum 0.20 long, 0.21 wide, coxa IV separated by 2.00 times their width. Leg I: patella d1, tibia d1, metatarsus p1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal macrosetae gently curved distally (Fig. 51C). Metatarsal trichobothria: TmI: 0.34; TmII: 0.31; TmIII: 0.36. Leg measurements: see Appendix A. Epiandrous gland spigots in two widely spaced clusters of two spigots each (Fig. 51D).

Female (CASENT 9024332): Total length 0.90, carapace 0.37 long, 0.36 wide, clypeus 0.07, sternum 0.24 long, 0.24 wide, coxa IV separated by 2.00 times their width. Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.34; TmII: 0.31; TmIII: 0.38. Leg measurements: see Appendix A. Spinnerets (Fig. 52D-F).

Genus *Maymena* Gertsch, 1960

Maymena Gertsch, 1960: 30. Type species *Nesticus mayanus* Chamberlin & Ivie, 1938 (=*Maymena mayana* (Chamberlin & Ivie, 1938)).

Natural History. Chinese *Maymena* build horizontal orb webs with some extraplanar lines, similar to those known from the Appalachian region of North America (P. Paquin, pers comm.; see Coddington 1986b, fig. 22; Griswold et al. 1998, fig. 3B; Lopardo and Coddington 2005, fig. 40.16). This is the first record of *Maymena* from beyond the Americas.

Paracymbium homology. Theridiosomatids are the only symphytognathoids with a distinct paracymbium (Griswold et al. 1998, but see Schütt 2003, Wunderlich 2004). The basal apophysis in some mysmenids (Figs 17B, 24C) and the hook-like cymbial apophysis in *Maymena* (Fig. 55) resemble a paracymbium, but are on the prolateral side, not the retrolateral side. However, the mysmenid palp is rotated so that the bulb sits on top of the cymbium rather than hanging down from it (i.e., the apophysis arises from the morphologically retrolateral face of the cymbium). Thus, the mysmenid cymbial apophyses could arise from the same part of the cymbium as the paracymbium after all. Possible paracymbium homologues in the Mysmenidae should be investigated as the phylogenetic structure of the family becomes better understood.

Maymena paquini Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:BD950E49-6462-434C-8BDD-587EAE361BB3
Figs 50D-F, 53-57, 99

Material Examined. Holotype: CHINA: Yunnan: Lushui Co., Daxingdi, Wayala Ku (cave), km 128 rd S-228, 26.13198°N, 98.86149°E, 910 m, 3 August 2005, cave, hu-

man impacted and flooded, P. Paquin, D. Kavanaugh, PP-1705 (CASENT 9022598, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022595, CAS), 1 ♂, 3 ♀; [same data as holotype] (CASENT 9022599, HNU), 9 ♀, 6 juvs; [same data as holotype] (CASENT 9022596, CAS), 1 ♂, 2 ♀, 4 juvs; [same data as holotype] (CASENT 9022594, CAS), 2 ♀; [same data as holotype] (CASENT 9022597, CAS), 1 ♀.

Etymology. Patronymic in honor of Pierre Paquin in recognition of his contributions to biospeleology.

Diagnosis. Male distinguished from other *Maymena* for which males are known (i.e., American species) by the elongate palpal tibia (Fig. 54A; compare to Gertsch, 1960: fig. 51).

Female distinguished from American species by the shape of the epigynal scape, which is relatively long and narrow (Figs 50D-F, 56A-C); distinguished from *M. kehen* by the wider scape, wider separation of the spermathecae, and by the lateral margin of the scape, which is uniquely notched in *M. kehen* (Fig. 50G-H). While distinctions between the two known Chinese *Maymena* species are subtle, they do seem to be consistent.

Description. Carapace pale orange. Labrum not swollen, weakly sclerotized, short labral tongue with flat ventral margin (Fig. 56E-F). Sternum orange. Legs orange. Femoral spots on legs I and II in female, leg I only in male. Tarsal organs set distal to proximal margin of tarsus (ratio of distance from proximal margin of tarsus to tarsal organ over total tarsus length *ca.* 0.15, Fig. 55F). Abdomen light gray with pair of dorsolateral dark gray patches (Fig. 53).

Male palp: Palpal patella and tibia elongate (Fig. 54A); palpal tibia with two trichobothria (Fig. 55D). Cymbium covers ventral part of palpal bulb, dorsal part exposed (Fig. 55A-B). Hook-like apophysis on prolateral face of cymbium (Fig. 55C). Embolus long and filiform with proximal origin (Fig. 54B).

Vulva: Epigynum a scape extending nearly to tracheal spiracle (Fig. 53B, D). Spermathecae round, ducts arise from anteroectal part, run posteriorly; fertilization ducts diverge from copulatory ducts, run anteromesally; copulatory ducts loop near base of scape (Fig. 50F), terminate in paired atria near middle of scape (Fig. 56A-C).

Male (CASENT 9022595): Total length 2.20, carapace 1.06 long, 0.95 wide, clypeus 0.25, sternum 0.56 long, 0.60 wide, coxa IV separated by 0.44 times their width. Leg I: femur d1, p2, r2, patella d2, tibia d1, p3, r1, metatarsus p1; Leg II: femur d1, p1, r2, patella d2, tibia d1, p2-3, r1, metatarsus with all prolateral setae strong; Leg III: femur d1, p1, r1, patella d2, tibia d1, p1, r1, metatarsus p1; Leg IV: femur d1, p1, r1, patella d2, tibia d1, p2, r1. Metatarsal macrosetae kinked proximal to center. Metatarsal trichobothria: TmI: 0.24; TmII: 0.24; TmIII: 0.33. Leg measurements: see Appendix A. Epiandrous gland spigots in four clusters of two-three spigots each (Fig. 56D). Posterior lateral spinnerets with flagelliform and aggregate gland spigots reduced to nubbins (Fig. 57F).

Female (CASENT 9022595): Total length 2.50 carapace 1.18 long, 0.99 wide, clypeus 0.23, sternum 0.66 long, 0.64 wide, coxa IV separated by 0.59 times their width. Leg I: femur d1, p1-3, r2, patella d2, tibia d1, p3, r1, metatarsus with all

prolateral setae strong; Leg II: femur d1, p1, r1-2, patella d2, tibia d1, p2-3, r1, metatarsus with all prolateral setae strong; Leg III: femur d1, p1, r1, patella d2, tibia d1, p2, r1, metatarsus p1; Leg IV: femur d1, r0-1, patella d2, tibia d1, p2, r1. Metatarsal trichobothria: TmI: 0.25; TmII: 0.27; TmIII: 0.34. Leg measurements: see Appendix A. Spinnerets (Fig. 57A-D).

***Maymena kehen* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:B5DA3B80-A85A-46A3-8091-1BDB156EF6B8
Figs 50G-H, 99

Material Examined. Holotype: CHINA: Yunnan: Fugong Co., Lishadi, 3.9 km E of Yamu River Fork, 27.12818°N, 98.86014°E, 1500 m, 10 August 2005, cave, P. Paquin, PP-3105 (CASENT 9022587, HNU), 1 ♀.

Paratypes: [same data as holotype] (CASENT 9022586, HNU), 2 ♀; [same data as holotype] (CASENT 9022585, CAS), 2 ♀; [same data as holotype] (CASENT 9022588, CAS), 1 ♀, 10 juvs.

Etymology. Formed from the Chinese word for notch (kè hén 刻痕), referring to the notch on either side of the epigynal scape that distinguishes this species from its close relative, *M. paquini*.

Diagnosis. See. *M. paquini*.

Description. Carapace pale orange. Sternum orange. Legs orange. Femoral spots on legs I and II. Abdomen light gray with pair of dorsolateral dark gray patches.

Vulva: Epigynum a scape extending nearly to tracheal spiracle, lateral margin with notch (Fig. 50H). Spermathecae round, ducts arise from anteromesal part, run posteriorly; fertilization ducts diverge from copulatory ducts, run anteromesally; copulatory ducts loop, then terminate in paired atria near base of scape (Fig. 50G-H).

Female (CASENT 9022586): Total length 2.45 carapace 1.11 long, 1.10 wide, clypeus 0.24, sternum 0.63 long, 0.64 wide, coxa IV separated by 0.71 times their width. Leg I: femur d1, p1, r1, patella d2, tibia d1, p2, r1, metatarsus with all prolateral setae strong; Leg II: femur d1, p1, r1, patella d2, tibia d1, p2, r1, metatarsus with all prolateral setae strong; Leg III: femur d1, p1, r1, patella d2, tibia d1, p1, r1, metatarsus p1; Leg IV: femur d1, p1, r1, patella d2, tibia d1, p1, r1. Metatarsal trichobothria: TmI: 0.25; TmII: 0.24; TmIII: 0.35. Leg measurements: see Appendix A.

Male unknown.

Family Anapidae Simon, 1895

The terminology used for the labrum is confused and confusing. In particular the terms "labral sclerite" and labral spur" have been used in synonymous and differing ways. An anteriorly projecting spur in the mouth region was recognized as early as Wunderlich (1976: figs 37, 38, "Sporn des Labium"), who erroneously referred to a

spur on the labium (rather than the labrum). Platnick and Shadab (1978a) suggested that an "anterior labral spur" was a synapomorphy for a redefined Anapidae, illustrated in their figure 1 of *Anapis keyserlingi* Gertsch, 1941. This labral spur was also depicted for *Anapisona hamigera* (Simon, 1897) by Platnick and Shadab (1979: fig. 10).

Subsequently arguments about the monophyly of, and placement in, Anapidae have hinged on the labral spur. We contend that this has never been precisely defined, and that this lack of a precise definition has fueled confusion. We suggest that there are at least three separate structures of the labrum that have been referred to as a spur. One of these is clearly the spur of Platnick and Shadab, but this is restricted to a mere handful of genera and does not characterize the majority of species currently placed in the Anapidae.

Snodgrass (1952: figs 31A, B) depicts in detail the pharynx, epistome, and labrum of a theraphosid spider. In these illustrations one can see structures that are widespread in Araneae, including the symphytognathoids. The labrum is a region of sclerotized cuticle just anterior to the epistome, the latter being the point of attachment for a pair of median dilator muscles of the pharynx. The morphology of the labrum was clearly described in detail by Kropf (1990). The labrum connects the palpal coxae in front of the mouth opening and bears a sclerite on its anterior wall, which Kropf (1990) calls the "labral sclerite" (Kropf 1990: figs 1, 6). There is a flattened, anteriad pointing labral tongue ("labral flap" of Lopardo and Hormiga 2008) that arises from the anterior face of the labrum with the apex projecting obliquely downward and towards the chelicerae. The apex is free and may be truncate, rounded, or deeply cleft. Beneath and beyond the apex there are short, smooth setae, which contrast to the plumose setae elsewhere on the labrum. Kropf (1990) refers to these as "minute, cuticular, bristle-like pins" arising from a cavity covered by the sclerite. These features occur widely in Araneomorphae (Fig. 93A-F). Posteriad of the base of the labral tongue the cuticle may be smooth and convex, or weakly to profoundly divided by a transverse groove. We think that these features are homologous across Araneomorphae (at least), and that they provide landmarks that enable precise definition of labral homologies.

Both *Anapis* Simon, 1895 (Fig. 58C, D) and *Anapisona* Gertsch, 1941 (Fig. 58A, B) have a large, anterodorsad pointing swelling at the base of the tongue. This is clearly the "spur" of Platnick and Shadab (1978a: fig. 1, 1979: fig. 10). But this feature is peculiar to only a few spiders, particularly *Anapis* and *Anapisona.* Most taxa assigned to Anapidae have no such structure, though the region at the base of the tongue may be more or less swollen (Figs 58E, F, 62C, D). Some *Anapis* species have an additional swelling, arising far posteriad of the base of the labral tongue. This was illustrated in Griswold et al. 1998 (fig. 20A, C) and mistakenly taken to typify the character labral spur.

To our knowledge all taxa currently assigned to Anapidae (and to other symphytognathoid families as well) have the labral tongue (Figs 41E, F, 62C, D, 70E, F), whereas the majority of taxa assigned to Anapidae lack the true labral spur sensu Platnick and Shadab. Confusion of the labral tongue with the labral spur has led to pointless arguments about the scope and monophyly of Anapidae. For example, Schütt (2000) discusses the mouthpart of anapids and micropholcommatids, illustrates the

labra of the members of the former (Schütt, 2000: fig. 5A–C) and the latter families (Schütt, 2000: fig. 5E, F), notes close resemblance, and concludes that all have a labral spur. Whereas all have a labral tongue, none have the projecting spur from the base of the tongue that typifies the labral spur sensu Platnick and Shadab. Likewise, Lopardo and Hormiga (2008), in their discussion of the placement of *Acrobleps*, note that this is unusual among the Anapidae in the absence of a labral spur. In fact, most anapids lack the spur. Most anapids, including the new genus *Gaiziapis* (Fig. 62 C, D) and *Gertschanapis* Platnick & Forster, 1990 (Fig. 58E-F, coded as present for the labral spur in Griswold et al. 1998), micropholcommatids, and *Acrobleps* (Lopardo and Hormiga 2008: fig. 12C-F), have the base of the tongue slightly swollen and raised higher than the level of the tongue apex. This subtle morphology may represent a synapomorphy at some level in the symphytognathoids, but deserves further survey.

Labral morphology may provide some corroboration for the monophyly of Symphytognathidae. The labra of the symphytognathid genera *Patu* Marples 1951 (Fig. 70E, F) and *Crassignatha* (Fig. 78B, C; see also Griswold et al. 1998: fig. 21A, B) have a spade shaped tongue typically bare dorsally except for a single, large plumose seta. This morphology differs from other araneoids and may prove to be a further synapomorphy for the Symphytognathidae.

There may be other post cheliceral characters that could be useful for future phylogenetic investigations, including the form of the labral tongue (entire, Figs 41E, 56E, 58E, 62C, 78B, Schütt 2000: fig. 5; or forked distally, Figs 58A, C, 93D, Miller et al. in review: fig. 2B), the margin between the endites and the labrum (rebordered, Fig. 58A, C; or simple, Figs 58E, 62C), separation (Figs 41E, 56E) or fusion (Figs 58A, C, E, 62C) of the endites behind the labrum, the distribution of tubercles on the endites, and the presence of lateral protuberances in archaeids and their relatives (Fig. 93B; Forster and Platnick 1984: fig. 90).

Ambiguities about the morphological characters that define the limits of Anapidae may help to explain the failure of structurally aligned ribosomal sequence data to recover either Anapidae or Anapidae plus Micropholcommatidae (cf. Schütt 2003) as monophyletic across several analytical permutations (Rix et al. 2008). Rix et al. (2008) included a substantial sample of anapid taxa. Two genera, *Risdonius* Hickman, 1939 and *Zealanapis* Platnick & Forster, 1989, are similar to the new genus *Gaiziapis* and consistently formed a well supported clade.

Diagnosis. Anapidae distinguished from other spider families in the Gaoligongshan except Symphytognathidae by the following combination of characters: the lack of a female pedipalp (Fig. 59C) and male epiandrous gland spigots (Fig. 62F), and by the insertion of the pedicel through an opening in the posterior declavity of the carapace (Figs 59C, 63E, F); distinguished from Symphytognathidae by having the chelicerae free to the base. Further distinguished from most other spiders in the Gaoligongshan by having the all tarsi more than 1.5 times the length of the metatarsi (Fig. 59A, C). The base of the labrium in Anapidae from the Gaoligongshan is slightly swollen, as high as or higher than the apex of the labral tongue (Fig. 62D) but the labral spur is absent (see above). *Gaiziapis zhizhuba* sp. n. is the only anapid known from the Gaoligongshan.

Genus *Gaiziapis* Miller, Griswold & Yin, gen. n.

urn:lsid:zoobank.org:act:188FC7F2-5809-44D8-A76B-91FE31D72BE5

Type species. *Gaiziapis zhizhuba* Miller, Griswold & Yin, sp. n.

Etymology. Formed from the Chinese words for cover or shell (gài zi 盖子) and a suffix (apis) common for anapid genera. The gender is feminine.

Diagnosis. Male distinguished from other anapids except *Zealanapis* Platnick & Forster, 1989, *Risdonius* Hickman, 1939, and *Tasmanapis* Platnick & Forster, 1989, by the deep anteromedian invagination of the dorsal scutum (Fig. 59B; Platnick & Forster, 1989: fig. 101); distinguished from *Risdonius*, and *Tasmanapis* by having a round, rather than triangular, abdomen and by the absence of a prolateral apophysis on the bulb (Platnick and Forster 1989: fig. 229); resembles *Zealanapis* in carapace texture and the form of the apophysis on the palpal patella, but differs in having a much more complicated palp with more membranes and sclerites (compare Fig. 61A with Platnick and Forster 1989: fig. 129).

Female distinguished from other Anapidae except *Enielkenie* Ono, 2006 by the following combination of characters: eight eyes, palp absent, book lung covers present, and abdomen round; distinguished from *Enielkenie* by the spacing of the eyes across the carapace (tightly grouped in *Enielkenie* so that the eyes take up about half the width of the carapace, Ono et al. 2006: fig. 20; spread out so the eyes take up nearly the entire width of the carapace in *Gaiziapis*: Fig. 59D), and by the reduced anterior median eyes in *Enielkenie*, subequal with other eyes in *Gaiziapis*.

Species. *Gaiziapis zhizhuba* sp. n.

Gaiziapis zhizhuba Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:A5F26A49-0CFA-4787-9533-5E048DD68BCA
Figs 50I, 59-64, 99

Material Examined. Holotype: CHINA: Yunnan: Longyang Co., Bawan Dist, Nankang Yakou, 24.83178°N, 98.76472°E, 2180 m, 22-25 May 2005, understory of good forest on E-facing slope, dusting webs near forest floor, C. Griswold, CGY115 (CASENT 9022379, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022380, CAS), 2 ♂, 5 ♀; [same data as holotype] (CASENT 9029301, HNU), 1 ♂, 6 ♀, 1 juv; [same data as holotype] (CASENT 9022381, HNU), 2 ♂, 6 ♀; [same data as holotype] (CASENT 9022389, CAS), 2 ♂; [same data as holotype] (CASENT 9029299, CAS), 2 ♀, 1 juv; [same data as holotype] (CASENT 9029300, CAS), 1 ♂; Longyang Co., Bawan Township, forest below Dasheyao Forestry Station in Hunan He valley, 24.92597°N, 98.75806°E, 2272 m, 3 June 2005, disturbed forest, beating understory vegetation, C. Griswold, CGY136 (CASENT 9022391, HNU), 1 ♂; Baoshan Prefecture, pass over Gaoligongshan, Nankang, 36 air km SE Teng Chong, 24.83333°N, 98.78333°E, 2100 m, 4-7 November 1998, native forest, C. Griswold, D. Kavanaugh, C.L. Long (CASENT 9029302, CAS), 1 ♂; Lushui Co., Yaojiaping, at Pianma Road km 44.7,

25.97479°N, 98.71027°E, 2516 m, 19-20 May 2005, disturbed forest, dusting webs in understory, C. Griswold, CGY111 (CASENT 9029298, CAS), 1 ♂, 1 ♀, 1 juv; [same data] (CASENT 9022366, CAS), 1 ♂, 3 ♀; [same data] (CASENT 9022365, HNU), 1 ♂, 3 ♀; [same data] (CASENT 9022364, HNU), 1 ♂, 3 ♀.

Etymology. Formed from the Chinese words for spider (zhī zhū 蜘蛛) and eight (bā 八), referring to the double-hubbed web (Fig. 64).

Diagnosis. Monotypic genus; see diagnosis for genus.

Description. Carapace reddish brown, thoracic region and clypeus with rugose texture. Sternum dusky red with rugose texture. Legs reddish brown, tarsal organ near proximal margin. Abdomen tan with many small red setal bases and a smaller number of larger red sigillae (without setae); with sclerotized ring around spinnerets; male with red dorsal scutum deeply invaginated anteriorly (Fig. 59). Book lung covers present (Figs 50I, 63E-F). Labrum swollen, without distinct apophysis (Fig. 62D-E).

Male palp: Palpal patella with anteriorly-directed apophysis on retrolateral side (Fig. 61E). Cymbium covers much of retrolateral face of bulb (Figs 60B, 61B). Ventral-prolateral region of bulb a complex group of apophyses, membranes, and invaginations (Figs 60A, 61A, C-D).

Vulva: Genital region covered by red sclerotized epigynum-like plate (Fig. 59E). Spermathecae round, copulatory duct leads from spermathecae to bursa (Fig. 50I). Fertilization ducts inconspicuous.

Male (CASENT 9022380): Total length 1.06, carapace 0.49 long, 0.44 wide, clypeus 0.25, sternum 0.29 long, 0.29 wide, coxa IV separated by 2.19 times their width. Leg I: patella d1, tibia d1, p1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.47; TmII: 0.44; TmIII: 0.40. Leg measurements: see Appendix A. Epiandrum sclerotized resembling female epigynum, epiandrous gland spigots absent (Fig. 62F). Posterior lateral spinnerets with complete sticky silk triplet (one flagelliform and two aggregate gland spigots; Fig. 63D).

Female (CASENT 9022380): Total length 1.18, carapace 0.48 long, 0.46 wide, clypeus 0.22, sternum 0.31 long, 0.31 wide, coxa IV separated by 2.11 times their width. Palp absent. Leg I: patella d1, tibia d1, p1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.45; TmII: 0.42; TmIII: 0.43. Leg measurements: see Appendix A. Spinnerets (Fig. 63A-C).

Natural History. This species builds a double-hubbed orb web (Fig. 64). The phenomenon of a single spider with a double hubbed web has been observed previously in *Tasmanapis* (Ramírez, pers. comm.), which shares with *Gaiziapis* the deeply invaginated male scutum. Possibly, the double hub architecture is typical for a clade of anapid spiders.

Family Symphytognathidae Hickman, 1931

Symphytopgnathids are typically characterized by cheliceral fusion, a sternum broadly truncated posteriorly, reduction of the female palp and eye number, and the absence of book lungs (Forster and Platnick 1977, Wunderlich 2004). However, some sym-

phytognathid genera have the chelicerae fused only at the base (e.g., *Patu*, *Curmagua* Forster and Platnick 1977) and the distinction between basally fused chelicerae and unfused chelicerae can be subtle. The remaining characters are present in other symphytognathoid families so enumerating synapomorphies for the family is problematic.

At least the symphytognathid species described here also share with anapids an insertion of the pedicel on the posterior slope of carapace (as typically associated with Anapidae; e.g. Jocqué and Dippenaar-Schoeman 2006) rather than the pleural region between carapace and sternum. Epiandrous gland spigots, present in theridiosomatids, mysmenids, and synaphrids, are absent from anapids and symphytognathids. *Crassignatha* is the only symphytognathid in which the male has an abdominal scutum, a trait more typical of Anapidae. The presence of a single tooth-like keel on the chelicerae and the lack of a fang furrow has been used in part to diagnose Synaphridae (Lopardo et al. 2007, Miller 2007). Some *Patu* (Fig. 69E-F) and *Crassignatha* (Fig. 78A) species exhibit these same characteristics.

Another character of possible interest for circumscribing Symphytognathidae concerns the situation of the aggregate gland spigots on a common base (Figs 71D, 85D, 92D; Griswold et al. 1998: figs 35D, 36D).

The presence of a colulus is homoplasious within some symphytognathid genera (Forster and Platnick 1977). A colulus is absent at least from *P. jidanweishi* and *Crassignatha* (investigated in *C. quanqu* sp. n. and *C. longtou* sp. n.). Some other *Patu* species do have a small colulus (e.g. Griswold et al. 1998: figs 23A, 37A).

The symphytognathid species described here are placed in the genera *Patu* and *Crassignatha* Wunderlich, 1995. *Patu* is a particularly problematic genus. Comparative anatomy of the genitalia across the genus has been rudimentary, a problem exacerbated by the scarcity of material in collections and the minute size of these animals. In practice, *Patu* are symphytognathids with minimal fusion of the chelicerae and 1-3 teeth (Forster 1959, Forster and Platnick 1977, Saaristo 1996). However, at least two of the *Patu* species described here have a distinctive cluster of 2-4 strong setae on the distoventral part of the male tibia II. Similar structures have been described for *Patu samoensis* Marples, 1951 and are found in *Crassignatha*. *Crassignatha* was cataloged in the Mysmenidae, apparently based on the presence of cymbial lobes and mating claspers. However, the distal cymbial tooth found in *Crassignatha* does not interact with the embolus as a functional conductor, as is typically the case in mysmenids. Also, the mating claspers in *Crassignatha* are on the distoventral part of tibia II; mating claspers in Mysmenidae are always found on the prolateral face of metatarsus and/or tibia I.

Diagnosis. Symphytognathidae distinguished from other spider families in the Gaoligongshan except Anapidae by the following combination of characters: the lack of a female pedipalp (Fig. 70C) and male epiandrous gland spigots (Fig. 78E), and by the insertion of the pedicel through an opening in the posterior declavity of the carapace (Fig. 65B, 74B); distinguished from Anapidae by the fusion of the chelicerae at least at the base (Figs 69F, 78A) and by having the aggregate gland spigots arise from a common base (Figs 71D, F, 92D). Like Anapidae and unlike most other spiders, Symphytognathidae typically have the tarsi longer than the metatarsi (Figs 74E, 83E), but the tarsi are rarely as much as 1.5 times the length of the metatarsi.

Key to Gaoligongshan Symphytognathidae

1 Carapace nearly smooth (Figs 69A, 70C); male abdomen lacking scutum (Fig. 65A)..... ***Patu* Marples, 1951** **2**

– Carapace sculptured with scales (Fig. 77E-F, 78F) or denticles (Fig. 91A-D); abdominal scutum on male wraps around posterior (Fig. 74A)..... .....***Crassignatha* Wunderlich, 1995** **6**

2(1) Females.....**3**

– Males.....**5**

3(2) Female epigynum with scape (Fig. 67A-C).....***Patu jidanweishi* sp. n.**

– Female epigynum without scape **4**

4(3) Looped path of the spermatheca/duct complex (Fig. 67F), epigynum with two juxtaposed dark circles showing through the integument (Fig. 67E)..... .....***Patu qiqi* sp. n.**

– Path of the spermatheca/duct complex elongate along longitudinal axis (Fig. 67H); epigynum with two less distinct comma-shaped structures showing through the integument (Fig. 67G) .....***Patu xiaoxiao* sp. n.**

5(2) Embolus long, flexible (Fig. 66) .....***Patu jidanweishi* sp. n.**

– Embolus short, not flexible (Fig. 73B) ..... ***Patu qiqi* sp. n.**

6(1) Abdomen rounded posteriorly **7**

– Two lobes on the posterodorsal part of the abdomen (Fig. 86D-F) .... ***Crassignatha ertou* sp. n.**

7(6) Carapace sculptured with scales (Fig. 77E-F, 78F). Metatarsus III lacking a trichobothrium.....**8**

– Carapace sculptured with denticles (Fig. 91A-D). Metatarsus III with a trichobothrium..... ***Crassignatha longtou* sp. n.**

8(7) Males.....**9**

– Females.....**12**

9(8) Embolus long, with kink or partial turn. Prosoma declining or weakly domed behind posterior eyes **10**

– Embolus short (Fig. 75A). Prosoma strongly domed behind posterior eyes (Figs 74A, 77E)..... ***Crassignatha pianma* sp. n.**

10(9) Embolus long, flexible, describing a half circle turn (Fig. 87A) .... ***Crassignatha yamu* sp. n.**

– Embolus shorter, rigid, helical or kinked, not describing a half circle turn.....**11**

11(10) Embolus with a strong kink about 1/3 its length from the origin (Figs 81A, 82C) ..... ***Crassignatha yinzhi* sp. n.**

– Embolus a single turn rigid spiral ribbon, not simply tapered but with a narrow waste near the midpoint (Fig. 84A)..... ***Crassignatha quanqu* sp. n.**

12(8) Scape oriented ventrally to posteroventrally (Figs 76F, 79D) with the distal lobe of the scape more narrow than the basal lobe (Figs 76G, 79C) and/or with the ducts running anteriorly between the spermathecae before turning posteriorly (Figs 76I, 89B, D) **13**

– Scape procurved (Figs 76A, 79B) composed of two lobes of equal width (Figs 76B, 79A); ducts do not run anteriorly between the spermathecae..... ..... ***Crassignatha pianma* sp. n.**

13(12) Distal lobe of the scape, more narrow than and projecting well beyond the basal lobe (Figs 76D, 79C-D). Copulatory ducts mostly restricted to area posterior to spermathecae **14**

– Scape lobes not well differentiated or same width (Fig. 79A). Copulatory ducts double back to run between spermathecae before turning back toward scape.....**15**

14(13) Scape projecting posteroventrally (Figs 79D, 80B). Abdomen dark in preserved specimens, subtriangular, maximum posterior extension of abdomen near dorsum..... ***Crassignatha yinzhi* sp. n.**

– Scape projecting ventrally (Figs 76F, 79F). Abdomen pale in preserved specimens, subspherical, maximum posterior extension of abdomen near center .. .. ***Crassignatha quanqu* sp. n.**

15(13) Ducts run straight and come together at a nearly 90° angle near the midpoint of the spermathecae (Fig. 76I)..... ***Crassignatha yamu* sp. n.**

– Ducts curve and come together near the posterior margin of the spermathecae (Fig. 89D) ..... ***Crassignatha gudu* sp. n.**

Genus *Patu* Marples, 1951

Patu Marples, 1951: 47. Type species *Patu vitiensis* Marples, 1951.

Patu jidanweishi Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:1C8AF042-4D42-48BA-A072-1058266329FD
Figs 65A-E, 66, 67A-D, 68-71, 100

Patu sp., Griswold and Yan, 2003: 356-360.

Material Examined. Holotype: CHINA: Yunnan: Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 13-15 May 2005, mixed broadleaf deciduous and evergreen forest, dusting small webs near ground in forest understory, C. Griswold, CGY104 (CASENT 9029293, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022356, CAS), 2 ♂, 4 ♀, 4 juvs; [same data as holotype] (CASENT 9029294, PV 0713-0716, CAS), 1 ♀; [same data as holotype] (CASENT 9029295, PV 0723-0728, CAS), 1 ♀; Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km 23.5, 24.82888°N, 98.76001°E, 2020 m, 27-28 May 2005, good primary broadleaf forest, dusting webs in understory, C. Griswold, CGY128 (CASENT 9029296, PV, CAS), 1 ♀; Nujiang Prefecture, native forest in Gaoligongshan at 9.5 road km ESE Pianma,

25.98333°N, 98.66667°E, 2500 m, 15-18 October 1998, C. Griswold, D. Kavanaugh, C.L. Long (CASENT 9029303, CAS), 1 ♂, 1 ♀; [same data] (CASENT 9023961, CG 17x98(2)7-15, CAS), 1 ♀; [same data] (CASENT 9023960, CG 17x98(2)16-22, CAS), 1 ♀; Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 12-21 May 2005, mixed broadleaf deciduous and evergreen forest, pitfall traps, C. Griswold, D. Kavanaugh, K. Guo, CGY103 (CASENT 9023102, CAS), 1♀, 4juvs; Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 12 May 2005, mixed broadleaf deciduous and evergreen forest, winkler extraction of sifted leaf litter, C. Griswold, D. Kavanaugh, K. Guo, CGY102 (CASENT 9022328, HNU), 1♀; Fugong Co., S Fork, Yamu He, 1.51 km 150° SW of confluence [with N Fork], Gaoligongshan, 27.11905°N, 98.83108°E, 1723 m, 26 April 2004, moist shaded embankments, C. Griswold, CGY13 (CASENT 9020753, HNU), 1♀; Gaoligongshan, 0.4 km SSE Shibali forest station, 27.16337°N, 98.78208°E, 2475 m, 5 May 2004, dusting webs in understory of good forest, C. Griswold, CGY29 (CASENT 9019862, CAS), 1 ♂, 1 ♀; [same data] (CASENT 9019863, HNU), 1 ♂, 1 ♀; [same data] (CASENT 9019864, HNU), 1 ♀, 4 juvs; Gaoligongshan, 0.5 km radius of Shibali forest station, 27.16519°N, 98.77891°E, 2525 m, 1-9, May, 2004, dusting webs in forest, C. Griswold, CGY25 (CASENT 9019875, CAS), 1 ♂, 1 ♀; [same data] (CASENT 9019877, HNU), 1 ♀, 11 juvs; [same data] (CASENT 9020650, HNU), 1 ♂, 1 ♀; [same data] (CASENT 9019874, CAS), 1 ♂, 1 ♀; [same data] (CASENT 9019876, HNU), 1 ♂, 1 ♀; [same data] (CASENT 9019873, CAS), 1 ♂, 1 ♀; [same data] (CASENT 9024143, HNU), 1 ♂, 2 ♀, 1 juv; Gaoligongshan, Shibali forest station, 27.16636°N, 98.77667°E, 2563 m, 3-11 May 2004, good forest, pitfall traps, C. Griswold, D. Kavanaugh, CGY21 (CASENT 9020351, HNU), 2 ♂, 1 ♀; [same data] (CASENT 9020350, CAS), 1 ♂, 1 ♀; Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, QiQi He, 9.9 airkm W of Gongshan, 27.715°N, 98.565°E, 2000 m, 9-14, July, 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9000375, HNU), 4 ♂, 4 ♀; [same data] (CASENT 9000374, CAS), 2 ♂, 10 ♀, 1 juv; [same data] (CASENT 9000373, HNU), 14 ♀; [same data] (CASENT 9000339, CAS), 1 ♀; [same data] (CASENT 9000370, "DL photo 7/12: symphyt beneath 1f w/ mys", CAS), 1 ♀; [same data] (CASENT 9000338, CAS), 1 ♀; [same data] (CASENT 9000343, CAS), 1 ♀; [same data] (CASENT 9000371, HNU) 2 ♂, 10 ♀, 1 juv; [same data] (CASENT 9000372, CAS), 14 ♀; [same data] (CASENT 9000342, "DL photo 1/12: indiv, symphyt w/eggs", CAS), 1 ♀; [same data] (CASENT 9000369, HNU), 1 ♀; [same data] (CASENT 9000340, CAS), 1 ♀; [same data] (CASENT 9000341, CAS), 1 ♀; [same data] (CASENT 9023115, HNU), 1 ♀.

Etymology. Formed from the Chinese words for egg (jī dàn 鸡蛋) and guardian (wèi shì 卫士), referring to the egg-guarding behavior described by Griswold and Yan (2003).

Diagnosis. Distinguished from other *Patu* species except *P. woodwardi* Forster, 1959, *P. marplesi* Forster, 1959, *P. qiqi* and *P. xiaoxiao* by the presence of only a single cheliceral tooth (Figs 69E-F, 70D, Forster 1959: fig. 122; two or more in other *Patu* species); male distinguished from *P. woodwardi* and *P. marplesi* by the presence of two

ventral subdistal spines on tibia II (Fig. 65E); distinguished from *P. qiqi* by the much longer embolus in *P. jidanweishi* (Fig. 66; short, not flexible in *P. qiqi*, Fig. 73B; male unknown in *P. xiaoxiao*); female distinguished from *P. qiqi* and *P. xiaoxiao* by the presence of a scape (Figs 67A-C, 70A-B).

Description. Carapace brown, male clypeus strongly raised with clusters of sulci (Fig 69A-D). Six eyes in three doublets (Fig. 69B). Sternum dark brown. Chelicerae fused near the base, with single prolateral tooth, fang furrow absent (Fig. 69E-F). Labrum not swollen, bearing single plumose seta, with ventrally rounded labral tongue (Fig. 70E-F). Female palp absent. Legs brown. Abdomen brown (Fig. 65A-D).

Male palp: Cymbium covers proximodorsal part of bulb (Fig. 66). Tegular region divided into numerous lobes (Fig. 68B). Embolus long, free, follows complex path (Fig. 66).

Vulva: Epigynum a lightly sclerotized scape (Fig. 67A-B) with a socket near the tip (Fig. 67C). Ducts make many turns around spermathecae (Fig. 67C).

Male (CASENT 9022356): Total length 0.69, carapace 0.29 long, 0.30 wide, clypeus 0.12, sternum 0.20 long, 0.20 wide, coxa IV separated by 2.10 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2, v2 on tubercle, metatarsus with ventral tubercle near center; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.43; TmII: 0.42; TmIII: 0.50. Leg measurements: see Appendix A. Epiandrous gland spigots absent (Fig. 68F). Posterior lateral spinnerets with sticky silk triplet, aggregate gland spigots on common base (Fig. 71F).

Female (CASENT 9022356): Total length 0.88, carapace 0.34 long, 0.31 wide, clypeus 0.05, sternum 0.22 long, 0.21 wide, coxa IV separated by 1.83 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.43; TmII: 0.44; TmI-II: 0.48. Leg measurements: see Appendix A. Spinnerets (Fig. 71A-D), posterior lateral spinnerets with aggregate gland spigots on common base (Fig. 71D).

Natural History. This species builds a horizontal orb web (Fig. 72A-B; see also page 12). Eggs (Fig. 67D) are placed on the periphery of the web, each individually wrapped (see Griswold and Yan 2003).

***Patu qiqi* Miller, Griswold & Yin, sp. n.**

urn:lsid:zoobank.org:act:FE61633D-A234-4A7E-BC72-16DC4B4731D0

Figs 65F-H, 67E-F, 73, 99

Material Examined. Holotype: CHINA: Yunnan: Gaoligong Shan, Nujiang Prefecture: Nujiang State Nature Reserve, QiQi He, 9.9 airkm W of Gongshan, 27.715°N, 98.565°E, 2000 m, 9-14 July 2000, H.-M. Yan, D. Kavanaugh, C.E. Griswold, H.-B. Liang, D. Ubick, & D.-Z. Dong (CASENT 9029328, HNU), 1 ♀.

Paratypes: [same data as holotype] (CASENT 9029326, CAS), 1 ♂, 5 ♀, 1 juv; [same data as holotype] (CASENT 9029327, HNU) 5 ♀, 2 juvs; [same data as holotype] (CASENT 9029329, with prey, CAS), 1 ♀.

Etymology. Named for the type locality.

Diagnosis. Distinguished from other *Patu* species except *P. woodwardi* Forster, 1959, *P. marplesi* Forster, 1959, *P. jidanweishi* and *P. xiaoxiao* by the presence of only a single cheliceral tooth (Forster 1959: fig. 122; two or more in other *Patu* species); male distinguished from *P. woodwardi* and *P. marplesi* by the presence of two ventral subdistal spines on tibia II; distinguished from *P. jidanweishi* by the short, inflexible embolus in *P. qiqi* (Fig. 73B; longer and flexible in *P. jidanweishi*, Fig. 66; male unknown in *P. xiaoxiao*). Among *Patu* species with only one cheliceral tooth, female *P. qiqi* and *P. xiaoxiao* are distinguished from *P. woodwardi* (female unknown in *P. marplesi*) by the internal genitalia, spermathecae round and juxtaposed in *P. woodwardi* (Forster 1959: fig. 123), spermatheca/duct complexes clearly separated in *P. qiqi* (Fig. 67F) and *P. xiaoxiao* (Fig. 67H); distinguished from *P. jidanweishi* by the absence of a scape (Fig. 67B); *P. qiqi* distinguished from *P. xiaoxiao* by the looped path of the spermatheca/duct complex in *P. qiqi* (Fig. 67F), elongate along longitudinal axis in *P. xiaoxiao* (Fig. 67H). In ventral view, the epigynum of *P. qiqi* has two juxtaposed dark circles showing through the integument (Fig. 67E); *P. xiaoxiao* has two less distinct comma-shaped structures showing through the integument (Fig. 67G).

Description. Carapace brown. Six eyes in three doublets (Fig. 65G). Sternum dark brown. Chelicerae fused for about half their length, with single anterior tooth, fang furrow absent. Female palp absent. Legs brown. Abdomen medium gray, lighter dorsally (Fig. 65F-H).

Male palp: Illustrated in Fig. 73. Both palps of the single male specimen are partially expanded and many details of anatomy could not be determined precisely.

Vulva: Scape absent, two circular structures visible through integument near epigastric furrow (Fig. 67E). Spermatheca/duct complex more or less longitudinal with loop near center; duct narrow anteriorly, wider posteriorly (Fig. 67F).

Male (CASENT 9029326): Total length 0.65, carapace 0.27 long, 0.25 wide, clypeus 0.07, sternum 0.19 long, 0.18 wide, coxa IV separated by 2.10 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2, v2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.52; TmII: 0.47; TmIII: 0.44. Leg measurements: see Appendix A.

Female (CASENT 9029326): Total length 0.63, carapace 0.29 long, 0.26 wide, clypeus 0.04, sternum 0.19 long, 0.18 wide, coxa IV separated by 1.91 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.45; TmII: 0.43; TmIII: 0.59. Leg measurements: see Appendix A.

***Patu xiaoxiao* Miller, Griswold & Yin, sp. n.**

urn:lsid:zoobank.org:act:3EED308E-7422-43B9-AF4F-338663452785

Figs 67G-H, 99

Material Examined. Holotype: CHINA: Yunnan: Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 12 May

2005, mixed broadleaf deciduous and evergreen forest, winkler extraction of sifted leaf litter, C. Griswold, D. Kavanaugh, K. Guo, CGY102 (CASENT 9022329, HNU), 1♀.

Paratypes: [same data as holotype] (CASENT 9022327, CAS), 1♀; [same data as holotype] (CASENT 9029325, HNU), 1♀.

Etymology. Formed from the Chinese word for very small (xiǎo xiǎo 小小); this is the smallest spider known from the Gaoligongshan.

Diagnosis. Among *Patu* species with only one cheliceral tooth, female *P. xiaoxiao* and *P. qiqi* are distinguished from *P. woodwardi* (female unknown in *P. marplesi*) by the internal genitalia, spermathecae round and juxtaposed in *P. woodwardi* (Forster 1959: fig. 123), spermatheca/duct complexes clearly separated in *P. xiaoxiao* (Fig. 67H) and *P. qiqi* (Fig. 67F); distinguished from *P. jidanweishi* by the absence of a scape (Fig. 67B); *P. xiaoxiao* distinguished from *P. qiqi* by the elongate longitudinal axis of the spermatheca/duct complex in *P. xiaoxiao* (Fig. 67H; looped path in *P. qiqi*: Fig. 67F). In ventral view, the epigynum of *P. xiaoxiao* has two indistinct comma-shaped structures showing through the integument (Fig. 67G; two juxtaposed dark circles showing through the integument in *P. qiqi*: Fig. 67E).

Description. Carapace light brown with darker patches. Six eyes in three doublets. Sternum dark brown. Chelicerae fused for about half their length, with single prolateral tooth, fang furrow absent. Female palp absent. Legs brown. Abdomen mottled dark gray, lighter dorsally.

Vulva: Scape absent, two comma-shaped structures visible through integument near epigastric furrow (Fig. 67G). Spermatheca/duct complex longitudinal leading to pair of curved atria diverging anteriorly (Fig. 67H).

Female (CASENT 9022329): Total length 0.61, carapace 0.26 long, 0.28 wide, clypeus 0.04, sternum 0.19 long, 0.18 wide, coxa IV separated by 2.10 times their width. Leg I: patella d1, tibia d1; Leg II: patella d1, tibia d1; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.44; TmII: 0.48; TmIII: 0.47. Leg measurements: see Appendix A.

Male unknown.

Genus *Crassignatha* Wunderlich, 1995

Crassignatha Wunderlich, 1995: 546. Type species *Crassignatha haeneli* Wunderlich, 1995.

Family placement. Conflicting opinions have led to instability in the family placement of *Crassignatha*. Wunderlich (1995) described *Crassignatha* as part of the family Synaphridae (which he considered a subfamily of a broadly circumscribed Anapidae). Marusik and Lehtinen (2003) suggested it might belong to Symphytognathidae; Wunderlich (2004: 1081) suggested Anapidae (*sensu stricto*); Platnick (2008) has cataloged it under Mysmenidae. The systematics and circumscription of symphytognathoid

spider families, especially Anapidae and Symphytognathidae, is in need of revision. Nevertheless, we predict that an affinity between *Crassignatha* and at least some *Patu* among the Symphytognathidae will be born out, supported in part by similarities in cheliceral armature and the male tibia II clasping spur.

Diagnosis. Distinguished from other symphytognathid genera except *Patu* and *Curimagua* Forster & Platnick, 1977 by having the chelicerae fused only near the base (Fig. 78A); distinguished from *Patu* by the sculpturing of the carapace (Fig. 77E-F; Wunderlich 1995: fig. 15); usually further distinguished from *Patu* by the abdominal scutum in the male wrapping around the posterior (Fig. 74A; scutum absent in *C. haeneli*, Wunderlich 2004); from *Curimagua* by having eyes in three diads (two triads in *Curimagua*; Forster and Platnick 1977) and one (entire or bifid) or two cheliceral teeth (Figs 78A, 91E; *Curimagua* is toothless; Forster and Platnick 1977). The poorly known genus *Anapogonia* Simon, 1905 was not considered for this diagnosis.

Description. Tiny ecribellate araneoid spiders. Total length 0.6-1.3. Six eyes in three doublets (Fig. 82F, 91C). Carapace with fields of tubercles and pores (Figs 77E, F, 91A-D). Head region and clypeus raised in male, clypeus with two vertical clusters of sulci (Fig. 82F). Sternum truncate posteriorly. Chelicerae fused near base, fang furrow absent, usually with a single anterior tooth bearing a small mesal apex (Fig. 78A) except in *C. longtou*, which has two subequal teeth (Fig. 91E). Labrum weakly sclerotized, without spur (Fig. 78B-C). Female palp absent. Metatarsus-tarsus joint without synaphrid-like distal constriction (see Lopardo et al. 2007). Tarsal organ near proximal margin, round, on slightly raised base (Fig. 78D). Tibiae with two dorsal rows of trichobothria, metatarsi I and II (plus III in *C. longtou*) with trichobothrium. Male tibia II with field of 2-4 thick setae on ventral distal part. Abdominal setae long and sparse. Male abdomen usually with scutum laterally and posteriorly; female without scutum, although a sclerotized ring around spinnerets may be present (Fig. 80B). Spinnerets with ventral orientation. Adult male retains flagelliform aggregate triplet (Fig. 85F). Colulus absent (Fig. 85E). Epiandrous gland spigots absent (Fig. 78E).

Male palp: Palpal tibia without trichobothria (Fig. 77C). Cymbium with dorsal tooth near distal margin (Fig. 77B). Tegulum large and bulbous. Plate-like median apophysis on prolateral part of bulb. Membranous apophysis arises from near anterior part of median apophysis (Fig. 82C). Embolus usually thick, rigid, more or less spiral, rarely long and flexible.

Vulva: Epigynum present, usually a short rounded scape (Fig. 79), rarely a transverse bulge (Fig. 91F). Two round spermathecae separated by about their diameter. Copulatory ducts follow a path to near apex of scape (Fig. 76B); fertilization ducts inconspicuous.

Species. Wunderlich (1995) established *Crassignatha* to accommodate *C. haeneli* based on a single male specimen from Malaysia. Seven new species are added to the genus: *C. pianma*, *C. yinzhi*, *C. quanqu*, *C. yamu*, *C. ertou*, *C. gudu*, and *C. longtou*.

***Crassignatha pianma* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:AD950C98-9B09-40AC-85FE-04154475586F
Figs 67I, 72C-D, 74-75, 76A-B, 77, 78A-D, 79A-B, 98

Material Examined. Holotype: CHINA: Yunnan: Lushui Co., Pianma Township, Chang Yan He, 9.3 km ESE Pianma, 25.99363°N, 98.66651°E, 2470 m, 13-15 May 2005, mixed broadleaf deciduous and evergreen forest, dusting small webs near ground in forest understory, C. Griswold, CGY104 (CASENT 9022600, HNU), 1♂.

Paratypes: [same data as holotype] (CASENT 9029339, PV 0756-0758, CAS), 1♀; [same data as holotype] (CASENT 9029340, PV 0734-0735, CAS), 1♂; [same data as holotype] (CASENT 9029341, PV 0770-0778, CAS), 1♀; [same data as holotype] (CASENT 9022360, HNU), 2 ♂, 6 ♀, 1 juv; [same data as holotype] (CASENT 9022361, CAS), 3 ♂, 5 ♀, 1 juv.

Etymology. Named for the type locality.

Diagnosis. Male distinguished from other *Crassignatha* by the embolus shape (Fig. 75A), which is shorter than any other species.

Female distinguished by the procurved scape (Figs 76A, 79B) composed of two lobes of equal width (Figs 76B, 79A) in combination with ducts that do not run anteriorly between the spermathecae; other *Crassignatha* have the scape oriented ventrally to posteroventrally (Figs 76F, 79D) with the distal lobe of the scape more narrow than the basal lobe (Figs 76G, 79C) and/or with the ducts running anteriorly between the spermathecae before turning posteriorly (Figs 76I, 89B, D).

Description. Carapace orange-brown with small tubercles and sulci. Sternum orange-brown. Legs orange, femora I and II slightly swollen basally in female. Abdomen subspherical, light to medium gray, with numerous small sclerotized patches, some bearing long setae, male with single orange scutum laterally and posteriorly, female with small sclerite around spinnerets (Fig. 74).

Male palp: Median apophysis with two tapered distal processes. Embolus short, thick, and rigid, making a single turn (Fig. 75A, 77A).

Vulva: Scape slightly procurved (Figs 76A, 79B), with distal and basal lobes of equal width (Figs 76B, 79A). Spermathecae separated by their diameter. Ducts arise from posteromesal part of spermathecae, follow complex path mostly posterior to spermathecae before reaching openings near apex of scape.

Male (CASENT 9022360): Total length 0.86, carapace 0.43 long, 0.40 wide, clypeus 0.15, sternum 0.28 long, 0.26 wide, coxa IV separated by 2.15 times their width. Leg I: patella d1, tibia d2, metatarsus slightly sinuous, with two stiff bristles prolaterally; Leg II: patella d1, tibia d2, v3, metatarsus excavated proximoventrally; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.43; TmII: 0.44; TmIII: absent. Leg measurements: see Appendix A.

Female (CASENT 9022360): Total length 1.10, carapace 0.49 long, 0.45 wide, clypeus 0.11, sternum 0.30 long, 0.27 wide, coxa IV separated by 1.41 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1,

tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.43; TmII: 0.46; TmIII: absent. Leg measurements: see Appendix A.

Natural History. This species builds a horizontal orb web (Fig. 72C-D).

***Crassignatha yinzhi* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:D97E4962-C41A-4EEA-971B-1FABB5F3490A
Figs 72E, 76C-D, 78E, 79C-D, 80-82, 98

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km 23.5, 24.82888°N, 98.76001°E, 2020 m, 27-28 May 2005, good primary broadleaf forest, dusting webs in understory, C. Griswold, CGY128 (CASENT 9029322, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9029342, PV - 1st set, CAS), 2 ♀; [same data as holotype] (CASENT 9022375, CAS), 2 ♂, 5 ♀; [same data as holotype] (CASENT 9022376, HNU), 5 ♀; Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km 23.5, 24.82888°N, 98.76001°E, 2020 m, 28 May 2005, good primary broadleaf forest, night collecting, C. Griswold, D. Kavanaugh, CGY129 (CASENT 9022354, HNU), 1 ♂, 1 ♀; [same data] (CASENT 9022170, CAS), 2 ♀; Longling Co., Longjiang Township, Xiao Hei Shan Nature Reserve, 1.2 km SSE of Route S317 at km 23.5, 24.82888°N, 98.76001°E, 2020 m, 26 May 2005, good primary broadleaf forest, night collecting, C. Griswold, D. Kavanaugh, CGY127 (CASENT 9022396, HNU), 1 ♀.

Etymology. Formed from the Chinese words for long (yǐn 縯) and straight (zhí 直), referring to the shape of the terminal apophysis in the male palp.

Diagnosis. Male distinguished from other *Crassignatha* species except *C. ertou* by the long, rigid embolus with a strong kink about 1/3 its length from the origin (Figs 81A, 82C); distinguished from *C. ertou* by the longer embolus with fewer helical turns and by the lack of a pair of bumps on abdomen.

Female distinguished from other *Crassignatha* species except *C. quanqu* by the distal lobe of the scape, which is more narrow than and projects well beyond the basal lobe (Figs 76D, 79C-D); other *Crassignatha* species either have the lobes not well differentiated or they are the same width (Fig. 79A); distinguished from *C. quanqu* by the orientation of the scape, projecting posteroventrally in *C. yinzhi* (Figs 79D, 80B), ventrally in *C. quanqu* (Figs 76F, 79F), and elements of somatic morphology including abdomen color and shape, and the more distinct division between the cephalic and thoracic regions in *C. yinzhi* (contrast Fig. 80B with Fig. 83B).

Description. Carapace dark orange-brown with small tubercles and sulci. Sternum dark brown. Legs orange, femora I and II slightly swollen basally in female. Abdomen subtriangular, distinctly taller than long, dark gray, with numerous small sclerotized patches, some baring long setae, male with single orange scutum laterally and posteriorly, female with small sclerite around spinnerets (Fig. 80).

Male palp: Median apophysis with two tapered processes arising distally and ventrally. Embolus long, rigid, and tapered, making a single turn (Figs 81A, 82C).

Vulva: Scape projects posteroventrally (Fig. 80B), with narrow distal lobe on wider basal lobe (Figs 76D, 79C). Spermathecae separated by 3/4 their diameter. Ducts arise from mesal part of spermathecae, follow complex path mostly posterior to spermathecae before reaching openings near apex of scape (Fig. 76D).

Male (CASENT 9022375): Total length 0.92, carapace 0.42 long, 0.40 wide, clypeus 0.14, sternum 0.29 long, 0.26 wide, coxa IV separated by 2.07 times their width. Leg I: patella d1, tibia d2, metatarsus unmodified; Leg II: patella d1, tibia d2, v4, metatarsus excavated proximoventrally; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.45; TmII: 0.42; TmIII: absent. Leg measurements: see Appendix A.

Female (CASENT 9022375): Total length 1.27, carapace 0.32 long, 0.27 wide, clypeus 0.12, sternum 0.32 long, 0.29 wide, coxa IV separated by 2.00 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.40; TmII: 0.44; TmIII: absent. Leg measurements: see Appendix A.

Natural History. This species builds a horizontal orb web (Fig. 72E).

Crassignatha quanqu Miller, Griswold & Yin, sp. n.

urn:lsid:zoobank.org:act:3745AD70-626C-4FFB-9B20-B60D83C8995C
Figs 76E-G, 79E-F, 83-85, 96

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Zhen'an Township, Bang Bie village at stream at km 6.8 on Route S317, 24.81333°N, 98.83280°E, 1545-1560 m, 24 May 2005, shaded embankments along stream, dusting webs in understory, C. Griswold, CGY119 (CASENT 9029323, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022387, CAS), 1 ♂, 1 ♀; [same data as holotype] (CASENT 9022388, HNU), 1 ♂, 1 ♀, 1 juv.

Etymology. Formed from the Chinese word for twisted (quán qū 蜷曲), referring to the shape of the embolus in the male palp.

Diagnosis. Male distinguished by the unique embolus shape, which is a rigid spiral ribbon making a single turn, not simply tapered but with a narrow waste near the midpoint (Fig. 84A).

Female distinguished from other *Crassignatha* species except *C. yinzhi* by the distal lobe of the scape, which is more narrow than and projects well beyond the basal lobe (Figs 76G, 79E-F); other *Crassignatha* species either have the lobes not well differentiated or they are the same width (Fig. 79A); distinguished from *C. yinzhi* by the orientation of the scape, projecting ventrally in *C. quanqu* (Figs 76F, 79F), posteroventrally in *C. yinzhi* (Figs 79D, 80B), and elements of somatic morphology including abdomen color and shape, and the more distinct division between the cephalic and thoracic regions in *C. yinzhi* (contrast Fig. 80B with Fig. 83B).

Description. Carapace orange-brown with small tubercles and sulci. Sternum dark brown. Legs orange. Abdomen subspherical, pale orange, with numerous small sclerotized patches, some baring long setae, male with single orange scutum laterally and posteriorly, female without sclerite around spinnerets (Fig. 83).

Male palp: Median apophysis with two tapered distal processes. Embolus a moderately long, rigid spiral ribbon making a single turn, shape complex, not simply tapered (Fig. 84A).

Vulva: Scape projects ventrally (Figs 76F, 79F), with narrow distal lobe on wider basal lobe (Figs 76G, 79E). Spermathecae separated by half their diameter. Ducts arise from posteromesal part of spermathecae, follow complex path before opening near scape apex (Fig. 76G).

Male (CASENT 9022387): Total length 0.73, carapace 0.35 long, 0.34 wide, clypeus 0.11, sternum 0.25 long, 0.24 wide, coxa IV separated by 2.00 times their width. Leg I: patella d1, tibia d2, p1, metatarsus unmodified; Leg II: patella d1, tibia d2, v2, metatarsus excavated proximoventrally; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.42; TmII: 0.42; TmIII: absent. Leg measurements: see Appendix A. Spinnerets (Fig. 85F)

Female (CASENT 9022387): Total length 1.00, carapace 0.41 long, 0.38 wide, clypeus 0.09, sternum 0.25 long, 0.24 wide, coxa IV separated by 1.63 times their width. Leg I: patella d1, tibia d2, p1; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.41; TmII: 0.41; TmIII: absent. Leg measurements: see Appendix A. Spinnerets (Fig. 85A-D)

***Crassignatha yamu* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:D4A81694-3689-4399-8D50-0A41AB03066D
Figs 76H-I, 86A-C, 87, 94

Material Examined. Holotype: CHINA: Yunnan: Fugong Co., S Fork, Yamu He, 1.51 km 150° SW of confluence [with N Fork], Gaoligongshan, 27.11905°N, 98.83108°E, 1723 m, 26 April 2004, moist shaded embankments, C. Griswold, CGY13 (CASENT 9029321, HNU), 1♂.

Paratypes: [same data as holotype] (CASENT 9020751, CAS), 1♀; [same data as holotype] (CASENT 9020752, HNU), 1 ♀, 1 juv; Fugong Co., Shilajia village on N fork, Yamu He, Gaoligongshan, 27.13440°N, 98.82625°E, 1792 m, 24 April 2004, moist steep stream banks, C. Griswold, CGY09 (CASENT 9029348, CAS), 1 ♀; 10 rd km W NuJiang on Shibali Rd., N fork, Yamu He, Gaoligongshan, 27.13795°N, 98.82240°E, 1850 m, 25 April 2004, moist earthen embankments, C. Griswold, CGY11 (CASENT 9029291, with prey, CAS), 1 ♀; [same data] (CASENT 9020735, CAS), 2 ♀; [same data] (CASENT 9020736, HNU), 2 ♀.

Etymology. Named for the type locality.

Diagnosis. Male distinguished by the long, flexible embolus describing a half circle turn (Fig. 87A).

Female distinguished by the duct path, which follows a complex path from the spermathecae to near the posterior margin of the epigynum, then runs anteriorly between the spermathecae before turning toward the origin near the scape apex (Fig. 76I). Among other *Crassignatha* species, only *C. gudu* shares with *C. yamu* a duct that runs from the posterior margin of the epigynum anteriorly to the region between the spermathecae before turning, meeting, and running in parallel to the copulatory opening; *C. yamu* distinguished from *C. gudu* by the region where the the ducts meet before running to the copulatory openings; in *C. yamu*, the ducts run straight and come together at a nearly 90° angle near the midpoint of the spermathecae (Fig. 76I) while in *C. gudu*, the ducts curve and come together near the posterior margin of the spermathecae (Fig. 89D).

Description. Carapace orange with small tubercles and sulci, less pronounced in female. Sternum dark brown. Legs orange, darker distally on tibiae and metatarsi, femora I and II slightly swollen basally in female. Abdomen subspherical, light to dark gray, with numerous small sclerotized patches, some baring long setae, male with single orange scutum laterally and posteriorly, female without sclerite around spinnerets (Fig. 86A-C).

Male palp: Median apophysis with one tapered process. Embolus long, flexible, tapered, makes a half turn, tip curved more strongly (Fig. 87A).

Vulva: Scape projects ventrally (Fig. 86A). Spermathecae separated by their diameter. Ducts arise from posteromesal part of spermathecae, follow complex path, meet between spermathecae before running to opening near scape apex (Fig. 76I).

Male (CASENT 9029321): Total length 0.75, carapace 0.35 long, 0.35 wide, clypeus 0.14, sternum 0.24 long, 0.24 wide, coxa IV separated by 2.08 times their width. Leg I: patella d1, tibia d2, metatarsus unmodified; Leg II: patella d1, tibia d2, v2, metatarsus excavated proximoventrally; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.46; TmII: 0.40; TmIII: absent. Leg measurements: see Appendix A.

Female (CASENT 9020752): Total length 0.94, carapace 0.42 long, 0.36 wide, clypeus 0.09, sternum 0.26 long, 0.24 wide, coxa IV separated by 2.00 times their width. Leg I: patella d1, tibia d2, p1; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.43; TmII: 0.45; TmIII: absent. Leg measurements: see Appendix A.

Crassignatha ertou **Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:E0051348-2351-4E8D-8B2C-71871C4799B6
Figs 86D-F, 88, 89A-B, 100

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Mangkuan Township, Zaotang He at Baihualing village, 25.30450°N, 98.80059°E, 1635 m, 2 June 2005, good subtropical broadleaf forest, dusting webs in understory,C. Griswold, CGY135 (CASENT 9029324, HNU), 1 ♂.

Paratypes: [same data as holotype] (CASENT 9022397, HNU), 1 ♀; [same data as holotype] (CASENT 9022398, CAS), 1 ♂, 2 ♀; (CASENT 9029350, CAS), 1 ♀; [same data as holotype] (CASENT 9029344, PV 1033-1041, CAS), 1 ♀.

Etymology. Formed from the Chinese words for two (èr 二) and bump (literally head, tóu 头), referring to the two bumps on the abdomen of this species.

Diagnosis. Male and female distinguished from other *Crassignatha* species by the presence of two lobes on the posterodorsal part of the abdomen. See also diagnosis of *P. yinzhi* (Fig. 86D-F).

Description. Carapace brown. Sternum brown with rugose texture. Legs orange with dark rings distally on tibiae and metatarsi. Abdomen subspherical, dark gray, with numerous small sclerotized patches, some baring long setae, both sexes with pair of conspicuous bumps on the posterodorsal part of the abdomen; male with single orange scutum laterally and posteriorly, female without sclerite around spinnerets (Fig. 86D-F).

Male palp: Median apophysis with one tapered process. Embolus a long, rigid, tapered helix making a three turns (Fig. 88A).

Vulva: Scape projects ventrally (Fig. 86D). Spermathecae separated by two thirds their diameter. Ducts arise from mesal part of spermathecae, follow complex path before opening near scape apex (Fig. 89B).

Male (CASENT 9022398): Total length 0.88, carapace 0.39 long, 0.35 wide, clypeus 0.13, sternum 0.25 long, 0.24 wide, coxa IV separated by 1.85 times their width. Leg I: patella d1, tibia d2, metatarsus unmodified; Leg II: patella d1, tibia d2, v3, metatarsus excavated proximoventrally; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.45; TmII: 0.41; TmIII: absent. Leg measurements: see Appendix A.

Female (CASENT 9022398): Total length 0.97, carapace 0.42 long, 0.35 wide, clypeus 0.12, sternum 0.28 long, 0.24 wide, coxa IV separated by 1.92 times their width. Leg I: patella d1, tibia d2; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.40; TmII: 0.42; TmIII: absent. Leg measurements: see Appendix A.

***Crassignatha gudu* Miller, Griswold & Yin, sp. n.**

urn:lsid:zoobank.org:act:EC5C403D-7C79-4A0B-9456-4DDC9CE59396

Fig. 89C-D, 96

Material Examined. Holotype: CHINA: Yunnan: Longling Co., Mangkuan Township, Zaotang He at Baihualing village, 25.30450°N, 98.80059°E, 1635 m, 2 June 2005, good subtropical broadleaf forest, dusting webs in understory, C. Griswold, CGY135 (CASENT 9029318, HNU), 1 ♀.

Etymology. Formed from the Chinese word for solitary (gū dú 孤独) since this species is known from only one sex.

Diagnosis. Female distinguished from other *Crassignatha* species except *C. yamu* by the duct path, which runs from the posterior margin of the epigynum anteriorly to

the region between the spermathecae before turning, meeting, and running in parallel to the copulatory opening (Fig. 89D); *C. gudu* distinguished from *C. yamu* by the region where the the ducts meet before running to the copulatory openings; in *C. gudu*, the ducts curve and come together near the posterior margin of the spermathecae (Fig. 89D) while in *C. yamu*, the ducts run straight and come together at a nearly 90° angle near the midpoint of the spermathecae (Fig. 76I).

Description. Carapace orange, darker laterally and in head region, tuberculate laterally. Sternum orange. Legs orange, darker distally on tibiae, metatarsi, and tarsi, femora I and II slightly swollen basally. Abdomen subspherical, dark gray, lighter anterodorsally, with numerous small light sclerotized patches concentrated dorsally along longitudinal axis, without sclerite around spinnerets.

Vulva: Scape projects posteroventrally (Fig, 89C). Spermathecae separated by their diameter. Ducts arise from posterior part of spermathecae, follow complex path, meet between spermathecae near their posterior margin before running to opening near scape apex (Fig. 89D).

Female (CASENT 9029318): Total length 0.92, carapace 0.42 long, 0.37 wide, clypeus 0.08, sternum 0.25 long, 0.26 wide, coxa IV separated by 2.00 times their width. Leg I: tibia p1 (no other macrosetae). Metatarsal trichobothria: TmI: 0.41; TmII: 0.38; TmIII: absent. Leg measurements: see Appendix A.

Male unknown.

***Crassignatha longtou* Miller, Griswold & Yin, sp. n.**
urn:lsid:zoobank.org:act:1C85F693-BCDE-4166-B0EB-5EE8998D3C50
Figs 89E-F, 90-92, 95

Material Examined. Holotype: CHINA: Yunnan: 10 rd km W NuJiang on Shibali Rd., N fork, Yamu He, Gaoligongshan, 27.13795°N, 98.82240°E, 1850 m, 25 April 2004, moist earthen embankments, C. Griswold, CGY11 (CASENT 9029292, HNU), 1 ♀.

Paratypes: [same data as holotype] (CASENT 9020731, CAS), 2 ♀; [same data as holotype] (CASENT 9020733, HNU), 3 ♀, 1 juv; [same data as holotype] (CASENT 9020732, HNU), 2 ♀; [same data as holotype] (CASENT 9020734, CAS), 1 ♀; [same data as holotype] (CASENT 9020744, with prey, CAS), 1 ♀; Fugong Co., 4.5 km N Aludi Village, 22.1 km N Fugong, 26.10829°N, 98.87162°E, 1250 m, 23 April 2004, in stream gorge, C. Griswold, CGY07 (CASENT 9020740, HNU), 1 ♀; Fugong Co., 4.5 km N Aludi Village, 22.1 km N Fugong, at stream entering NuJiang, 26.10829°N, 98.87162°E, 1263 m, 22 April 2004, in stream gorge, C. Griswold, CGY05 (CASENT 9020714, CAS), 1 ♀; [same data] (CASENT 9020713, HNU), 1 ♀; Fugong Co., Shilajia village on N fork, Yamu He, Gaoligongshan, 27.13440°N, 98.82625°E, 1792 m, 24 April 2004, moist steep stream banks, C. Griswold, CGY09 (CASENT 9020720, CAS), 2 ♀; [same data] (CASENT 9020721, CAS), 1 ♀; [same data] (CASENT 9029353, CAS), 2 ♀.

Etymology. Formed from the Chinese words for dragon (lóng 龙) and head (tóu 头), referring to the spiny texture of the carapace.

Diagnosis. Readily distinguished from other *Crassignatha* species by the fields of pointed spines on the carapace (91A-D). Further distinguished by the presence of a well developed sclerite around the spinnerets (Fig. 90A, C), a trichobothrium on the third metatarsus, and by the presence of two subequal teeth on the chelicerae (Fig. 91E). Placement of this species in the genus *Crassignatha* is tentative.

Description. Carapace dark orange, with three fields of pointed tubercles around thoracic margin (Fig. 91A). Sternum brown with rugose texture. Chelicerae with two subequal teeth (Fig. 91E). Legs orange, distal part of tibiae darker, femora I and II slightly swollen basally. Abdomen subspherical, mottled medium and light gray, with numerous small light sclerotized patches, some baring long setae, with conspicuous orange sclerite around spinnerets (Fig. 90).

Vulva: Epigynum a raised transverse lobe (Figs 89E, 91F). Round spermathecae separated by slightly less than their diameter. Ducts arise from mesal part of spermathecae, follow complex path to pair of openings (Fig. 89F).

Female (CASENT 9020720): Total length 0.87, carapace 0.35 long, 0.35 wide, clypeus 0.10, sternum 0.23 long, 0.22 wide, coxa IV separated by 2.31 times their width. Leg I: patella d1, tibia d2, p1; Leg II: patella d1, tibia d2; Leg III: patella d1, tibia d1; Leg IV: patella d1, tibia d1. Metatarsal trichobothria: TmI: 0.33; TmII: 0.38; TmIII: 0.41. Leg measurements: see Appendix A.

Male unknown.

Acknowledgments

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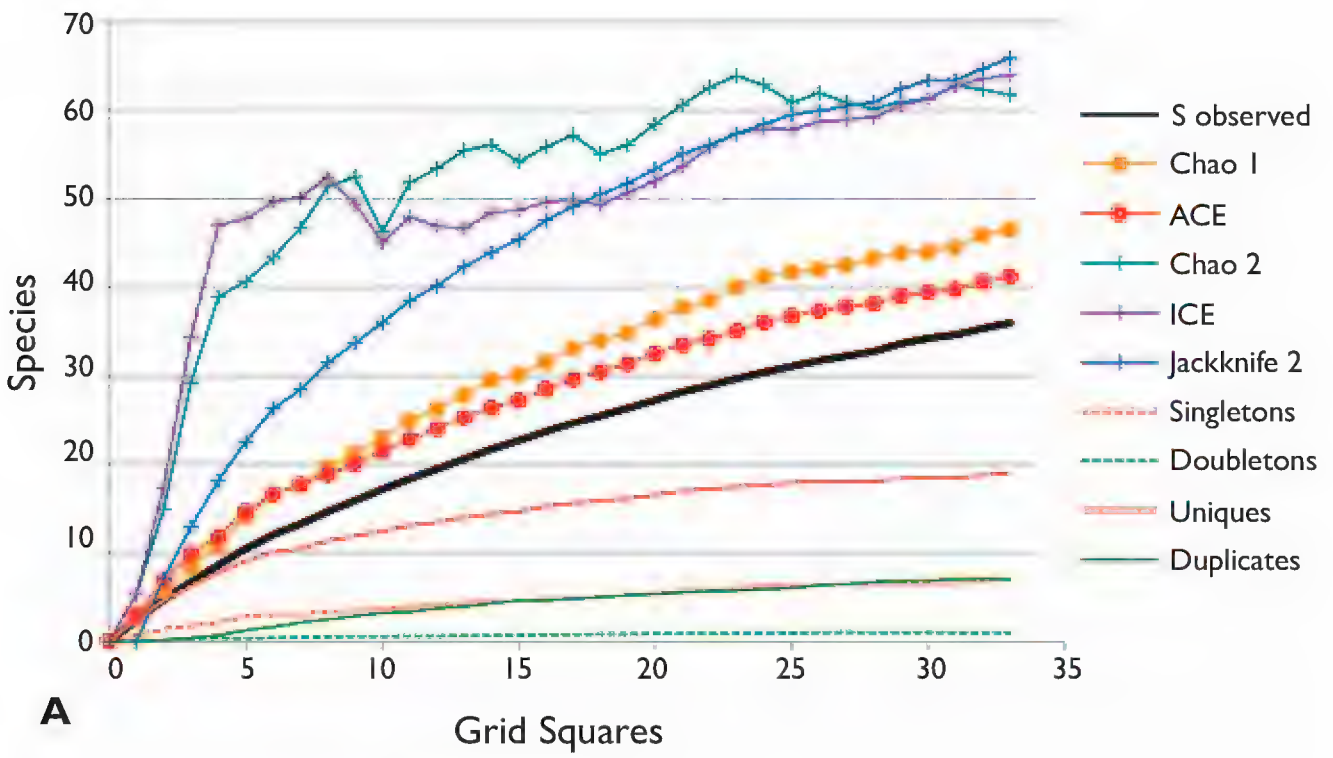
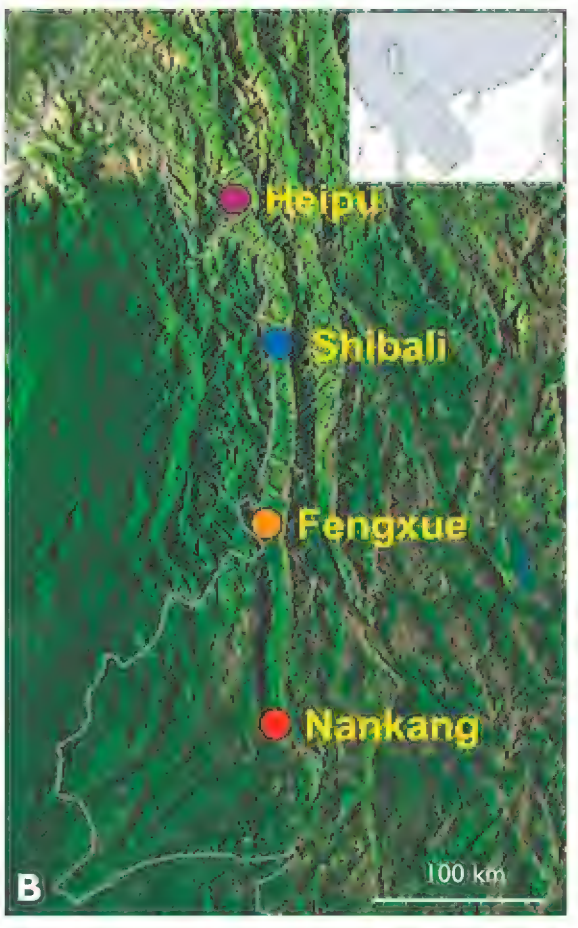




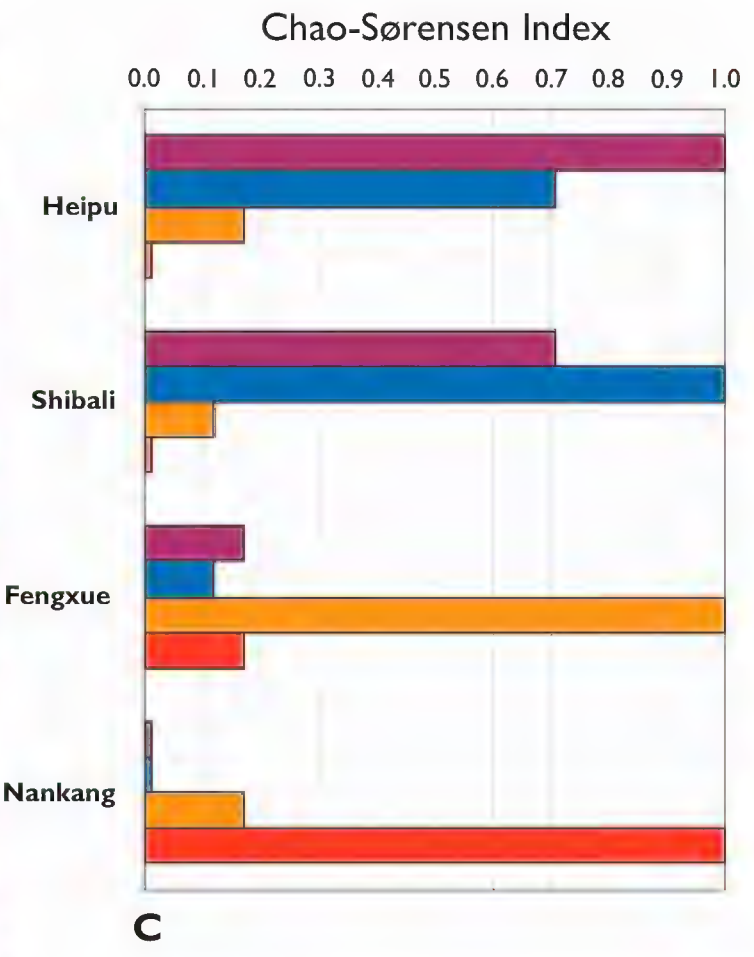


Figure 1. Diversity estimation based on micro-orbweavers collected in the Gaoligongshan during this study. A, Species richness estimation curves for all specimens; S observed is the raw number of observed species; Chao 1 and ACE are abundance based estimators driven by the number of individuals for each species across the entire date set (e.g., singletons and doubletons); Chao 2, ICE, and Jackknife 2 are incidence based estimators driven by the number of 1 km grid squares each species occurs in (e.g., uniques, duplicates); ACE = abundance based coverage estimator; ICE = incidence based coverage estimator; Jackknife 2 = second order jackknife (see also Colwell and Coddington 1994). B, Map of study area showing four core areas where sampling effort was concentrated; gray line demarcates China-Burma (Myanmar) border, inset map shows study area. C, Chao-Sørensen index for pairwise comparisons between core areas; purple: Heipu; blue: Shibali; orange: Fengxue; red: Nankang. The similarity of each core area to itself is considered to be 1.

Figure 2. *Epeirotypus dalong* sp. n. holotype from Fugong Co., male palp. A, prolateral; B, retrolateral; C, ventral. C: conductor; MA: median apophysis; PC: paracymbium; ST: subtegulum; T: tegulum; arrow in C indicates field of tubercles on mesal lobe of tegulum.

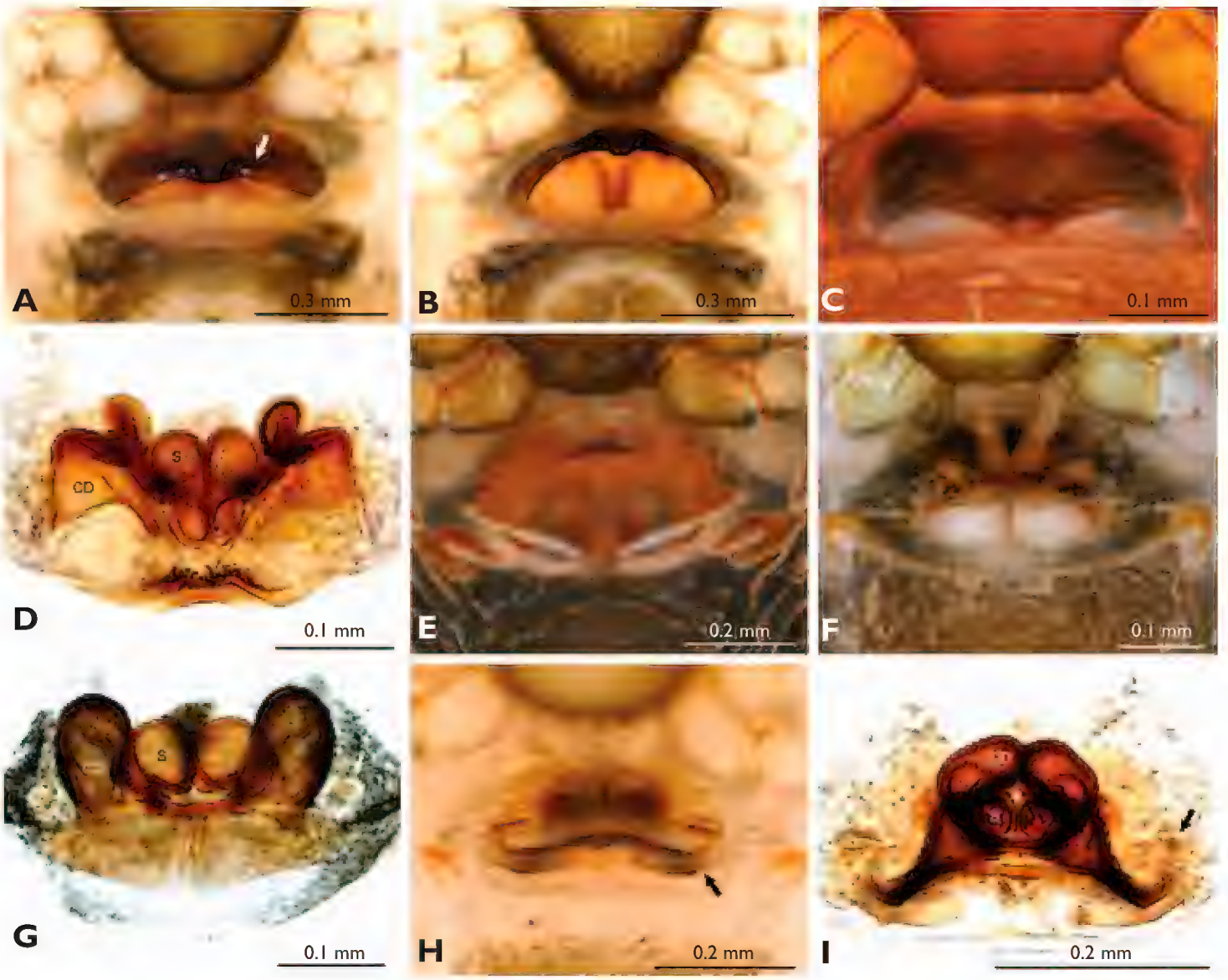


Figure 3. A, B, *Epeirotypus dalong* sp. n. from Fugong Co.; C, D, *Ogulnius barbandrewsi* sp. n.; C from Guocai He at Fucai; D from No. 12 Bridge Camp area; E, *Baalzebub nemesis* sp. n. from No. 12 Bridge Camp area; F, G, *Theridiosoma diwang* sp. n. from Xiao Hei Shan Nature Reserve; H, I, *Theridiosoma shuangbi* sp. n. from Xiao Hei Shan Nature Reserve. A, C, E, F, H, epigynum, ventral view; B, epigynum, posterior view; D, G, I, cleared vulva, dorsal view. CD: copulatory duct; S: spermatheca; arrow in A indicates transverse submarginal groove; in G and I indicate lateral pits, in H indicates base of one of two opposing lateral apophyses.

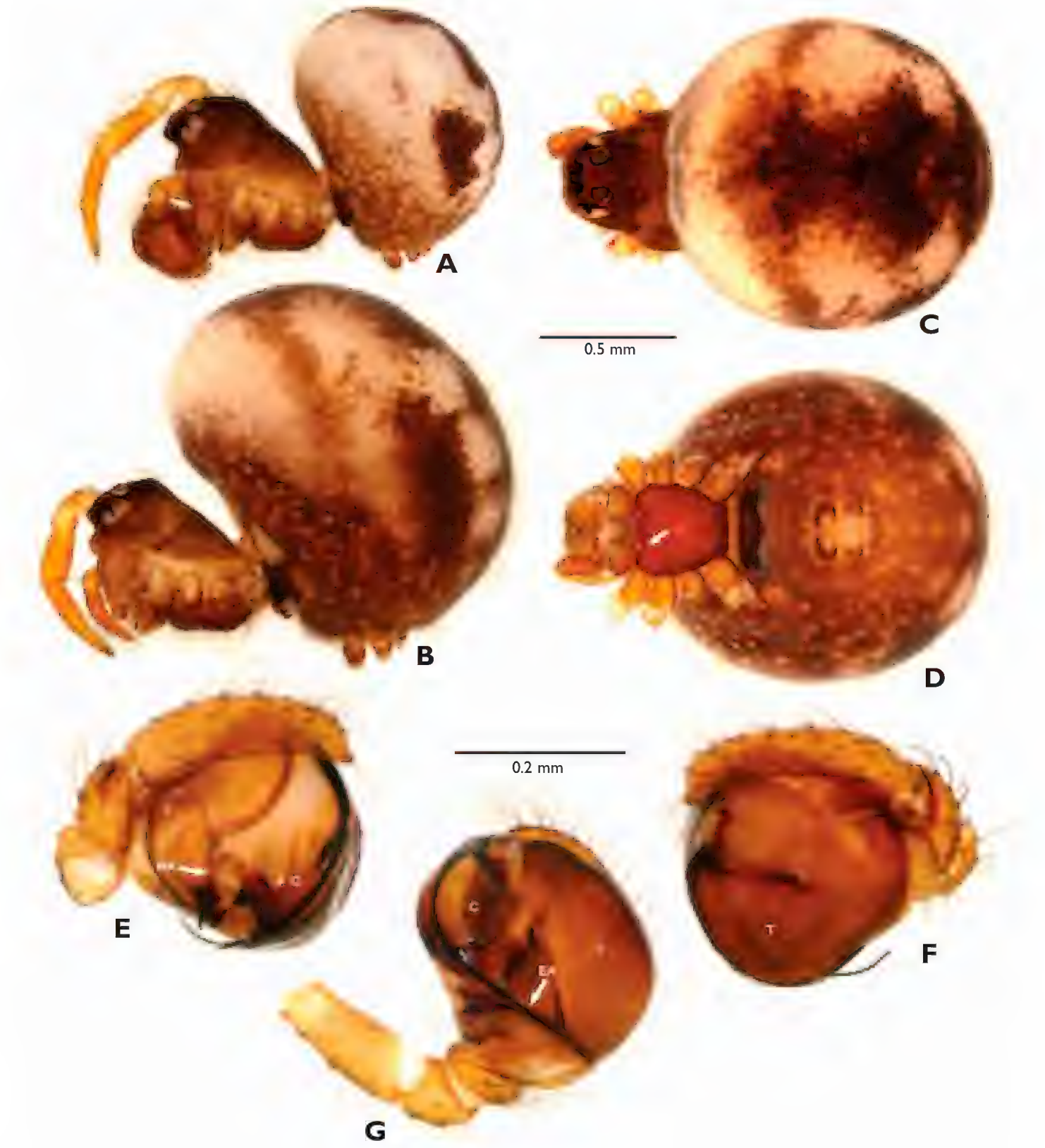


Figure 4. *Ogulnius barbandrewsi* sp. n. from Guocai He at Fucai. A-D, habitus; E-G, male palp. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, prolateral; F, retrolateral; G, ventral. C: conductor; EA: embolic apophysis; MA: median apophysis; T, tegulum; arrow in D indicates sternal pit.

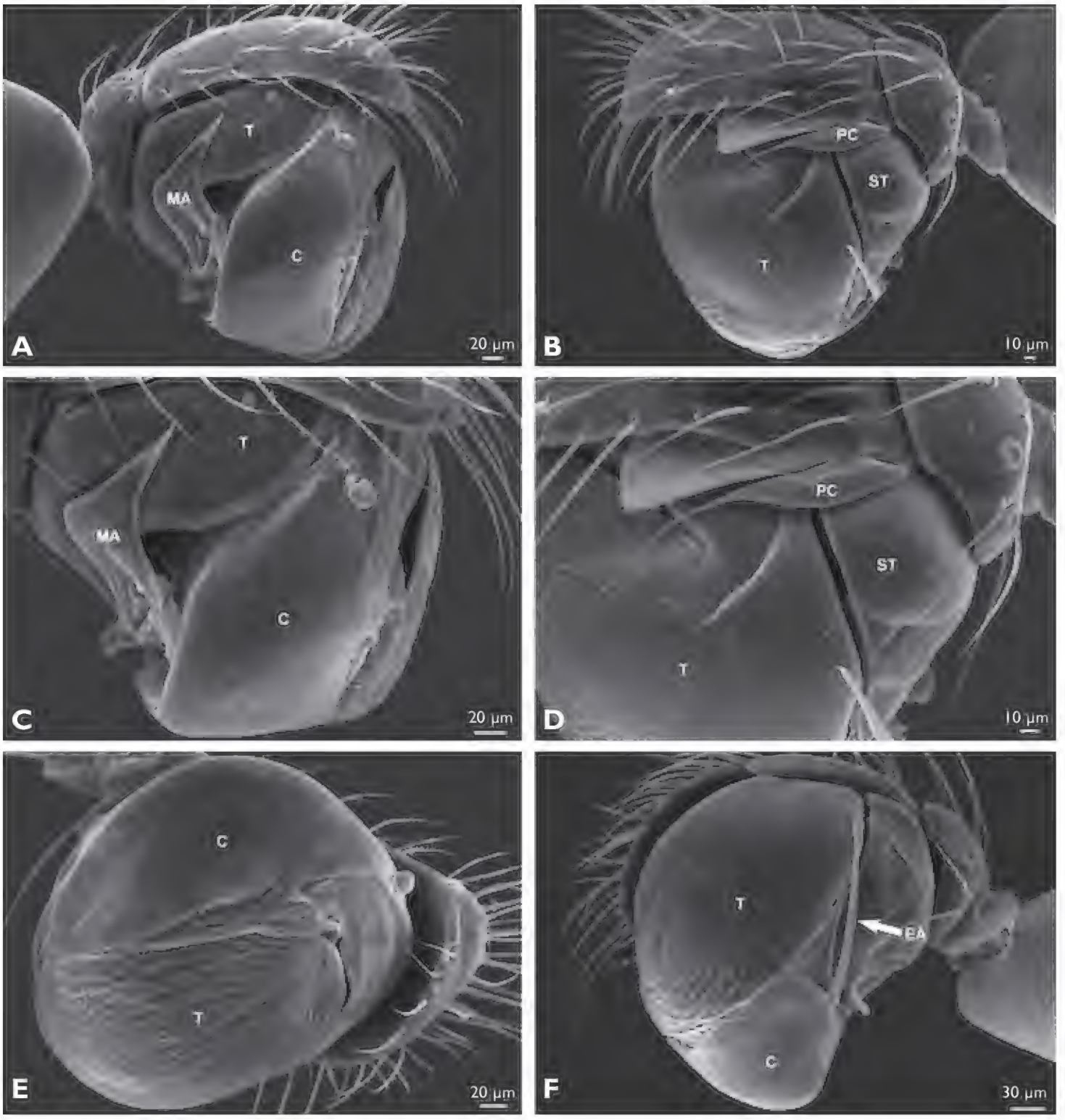


Figure 5. *Ogulnius barbandrewsi* sp. n. from Guocai He at Fucai, SEM of male palp. A, prolateral; B, retrolateral; C, prolateral, detail showing MA; D, retrolateral, detail showing paracymbium; E, apicoventral; F, retroventral showing EA. C: conductor; EA: embolic apophysis; MA: median apophysis; PC: paracymbium; ST: subtegulum; T, tegulum.

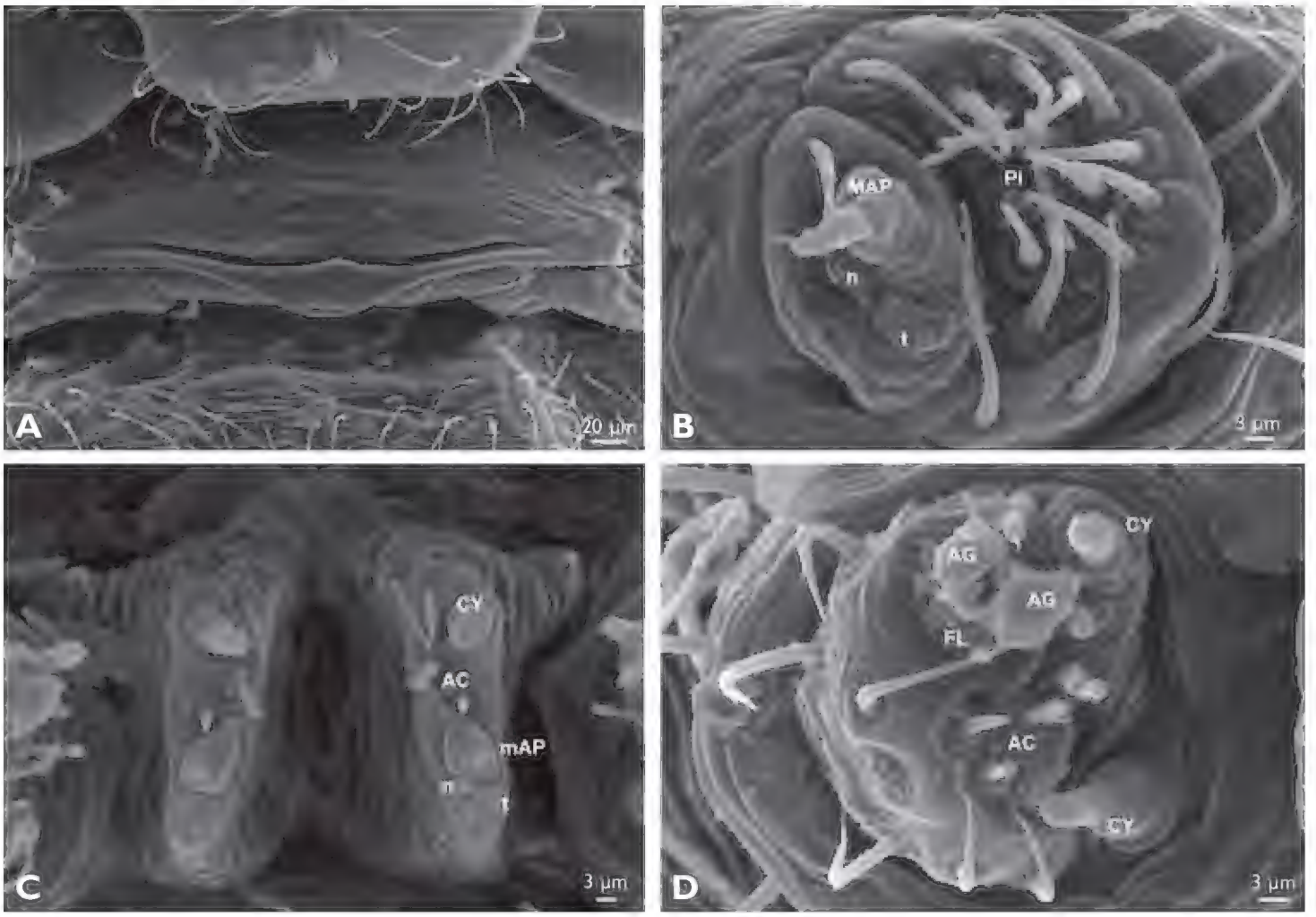


Figure 6. *Ogulnius barbandrewsi* sp. n. from Guocai He at Fucai, SEM of female. A, epigynum; B, ALS; C, PMS; D, PLS. AC: aciniform gland spigot; AG: aggregate gland spigot; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot, t: tartipore.

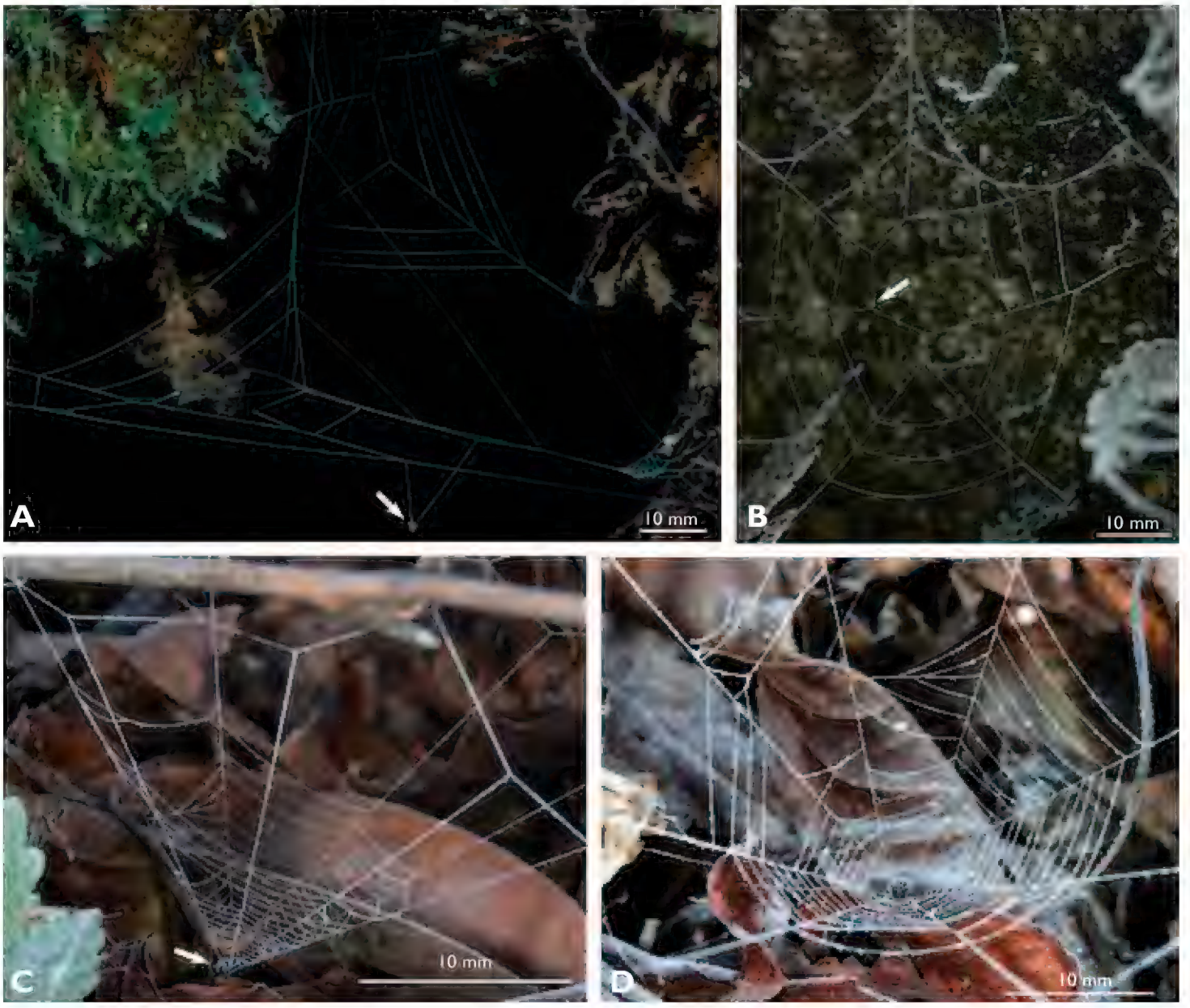


Figure 7. Webs of theridiosomatid spiders. A, *Ogulnius barbandrewsi* sp. n. from No. 12 Bridge Camp area, juvenile; B, *Ogulnius barbandrewsi* sp. n. from Guocai He at Fucai, juvenile, arrow to spider facing away from hub, tensing radial thread; C, D, *Theridiosoma diwang* sp. n. from Xiao Hei Shan Nature Reserve, female. Arrows indicate location of spider.

Figure 8. A, *Baalzebub nemesis* sp. n. from No. 12 Bridge Camp area; B, *Coddingtonia euryopoides* sp. n. from Zaotang He at Baihualing village; C-E, *Theridiosoma diwang* sp. n. from Xiao Hei Shan Nature Reserve, female. A, B, D, female, dorsal; C, female, lateral; E, female, ventral.

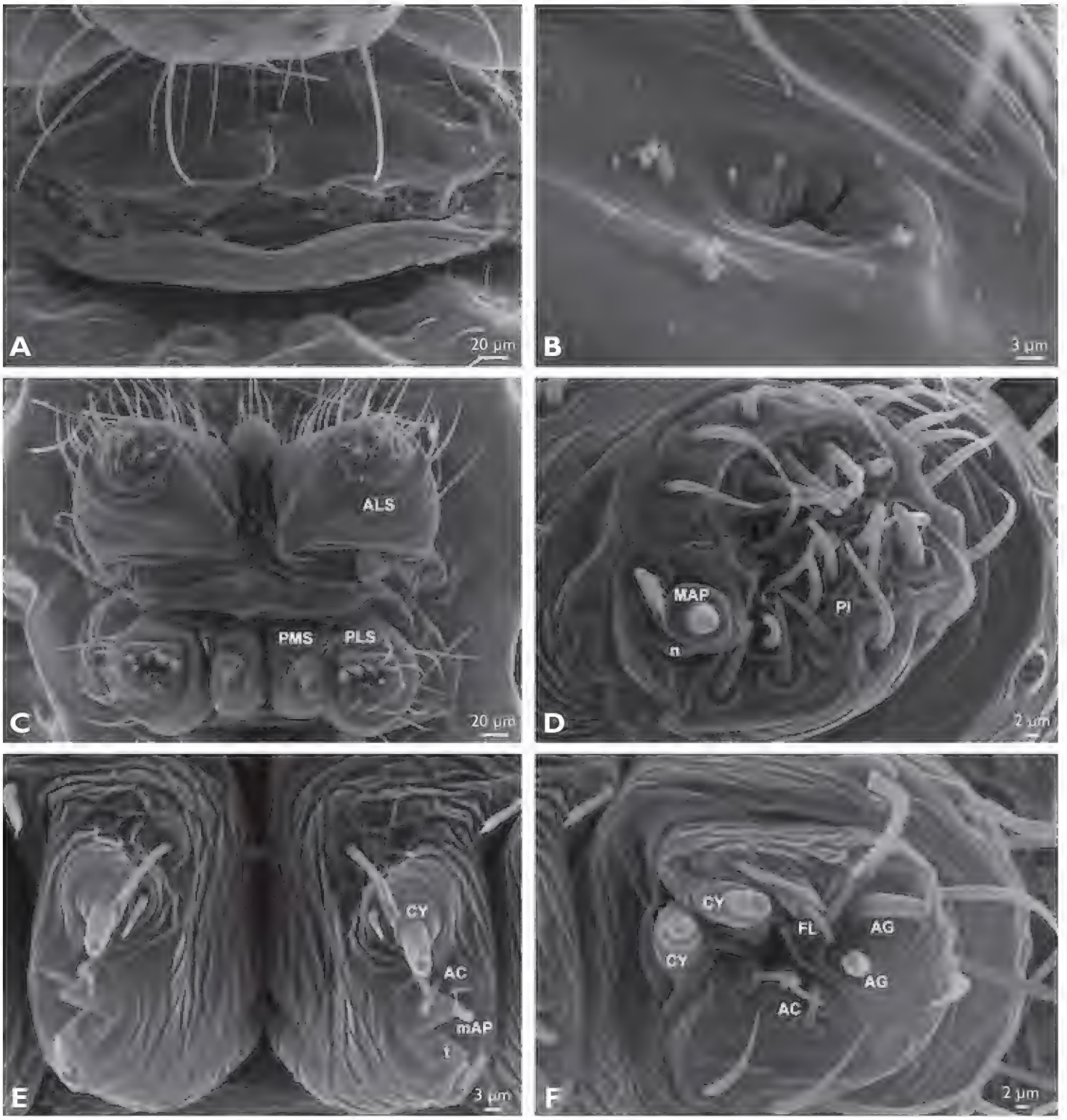


Figure 9. *Theridiosoma diwang* sp. n. from Xiao Hei Shan Nature Reserve, SEM of female. A, epigynum; B, epigynum, detail showing lateral pore; C, spinnerets; D, ALS; E, PMS; F, PLS. AC: aciniform gland spigot; AG: aggregate gland spigot; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot, PLS: posterior lateral spinneret, PMS: posterior median spinneret, t: tartipore.

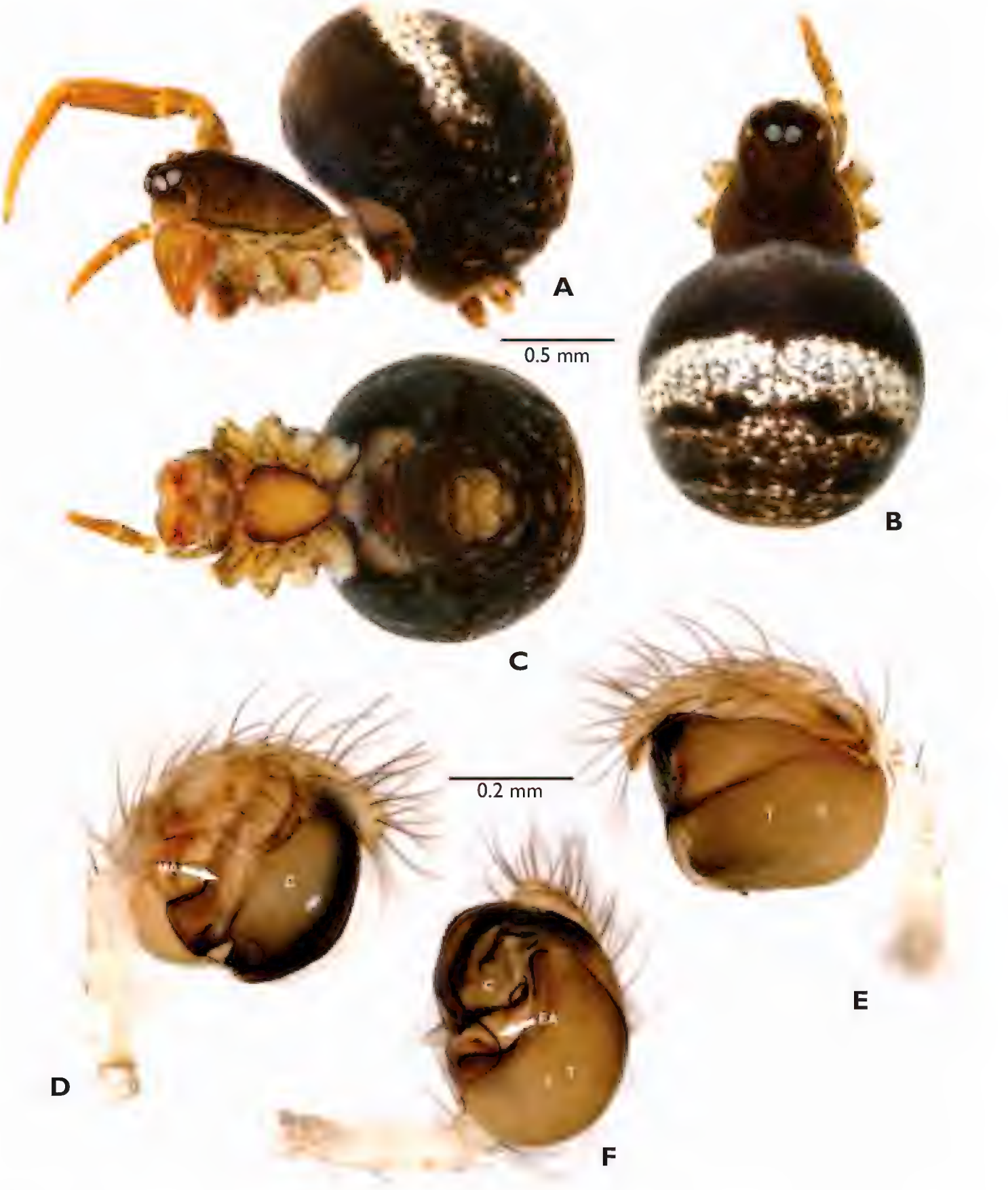


Figure 10. *Zoma dibaiyin* sp. n. from Pee He. A-C, female habitus; D-F, male palp. A, lateral; B, dorsal; C, ventral; D, prolateral; E, retrolateral; F, ventral. C: conductor; EA: embolic apophysis; MA: median apophysis; T, tegulum.

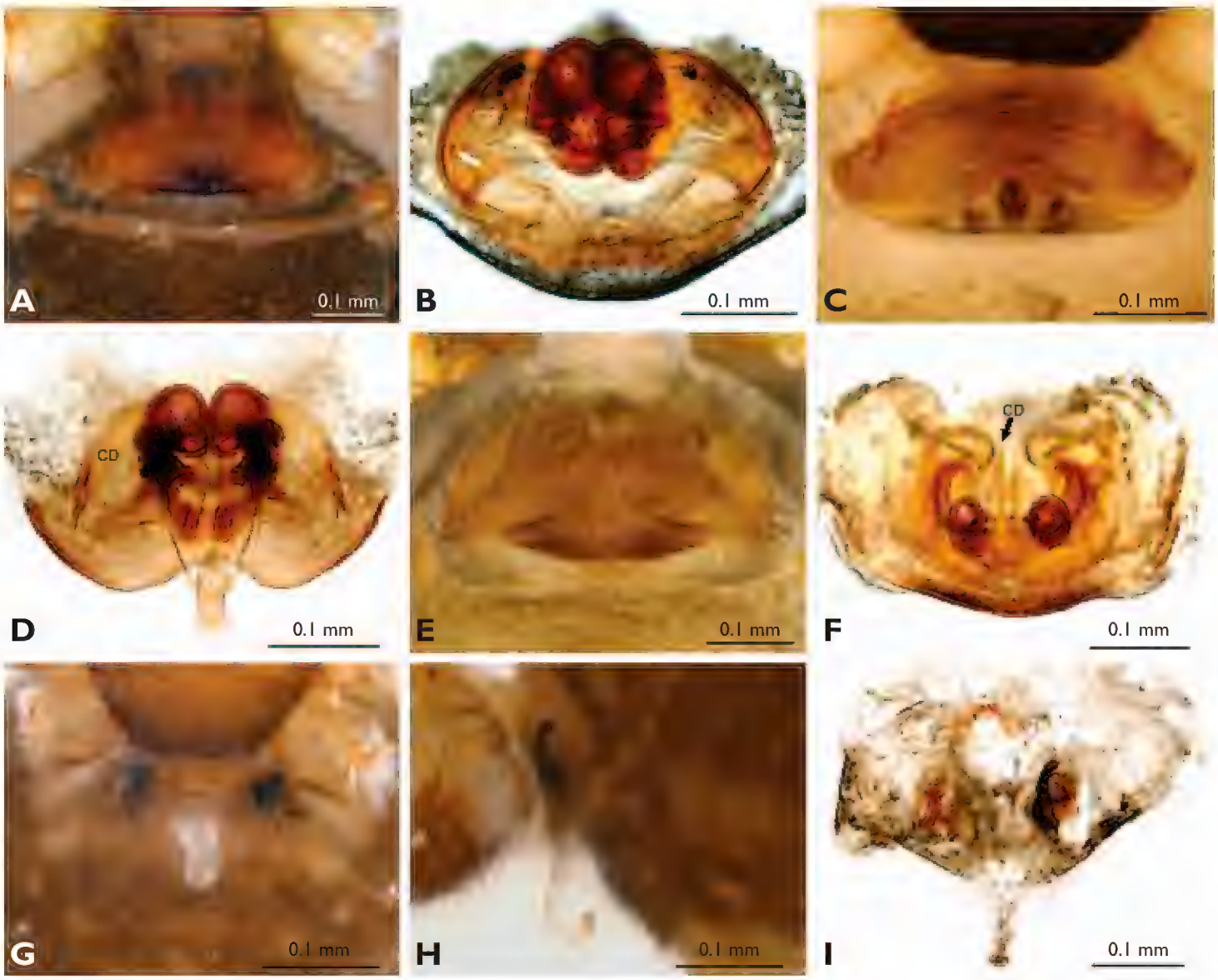


Figure 11. A, B, *Zoma dibaiyin* sp. n. from Pee He; C, D, *Wendilgarda muji* sp. n. from Xiao Hei Shan Nature Reserve; E, F, *Coddingtonia euryopoides* sp. n. from Zaotang He at Baihualing village; G-I, *Mysmena changouzi* sp. n. from from No. 12 Bridge Camp area. A, C, E, G, epigynum, ventral view; B, D, F, I, cleared vulva, dorsal view; H, epigynum, lateral view. Arrow in B indicates lateral pit.

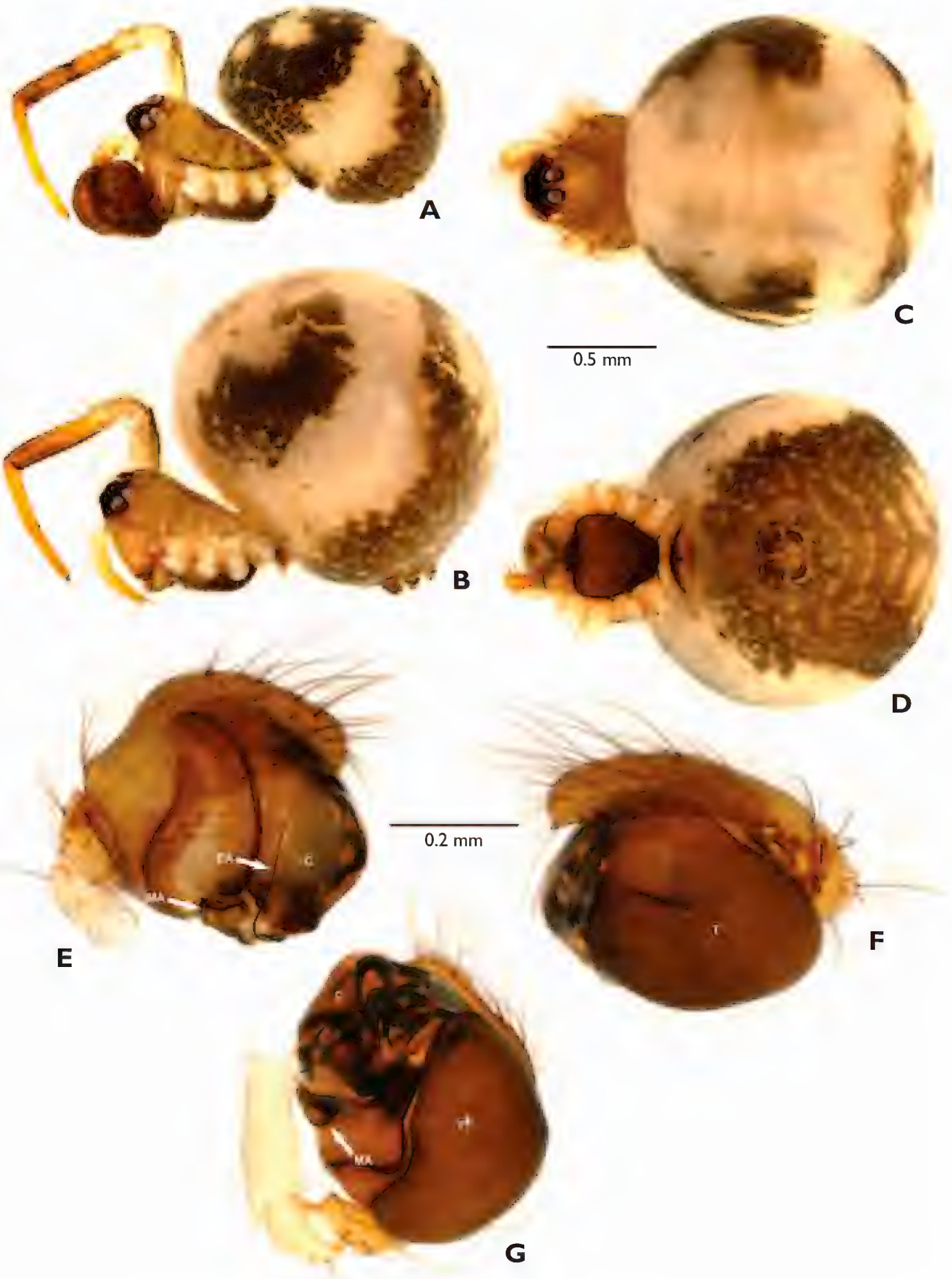


Figure 12. *Wendilgarda muji* sp. n. from Xiao Hei Shan Nature Reserve. A-D, habitus; E-G, male palp. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, prolateral; F, retrolateral; G, ventral. C: conductor; EA: embolic apophysis; MA: median apophysis; T: tegulum.

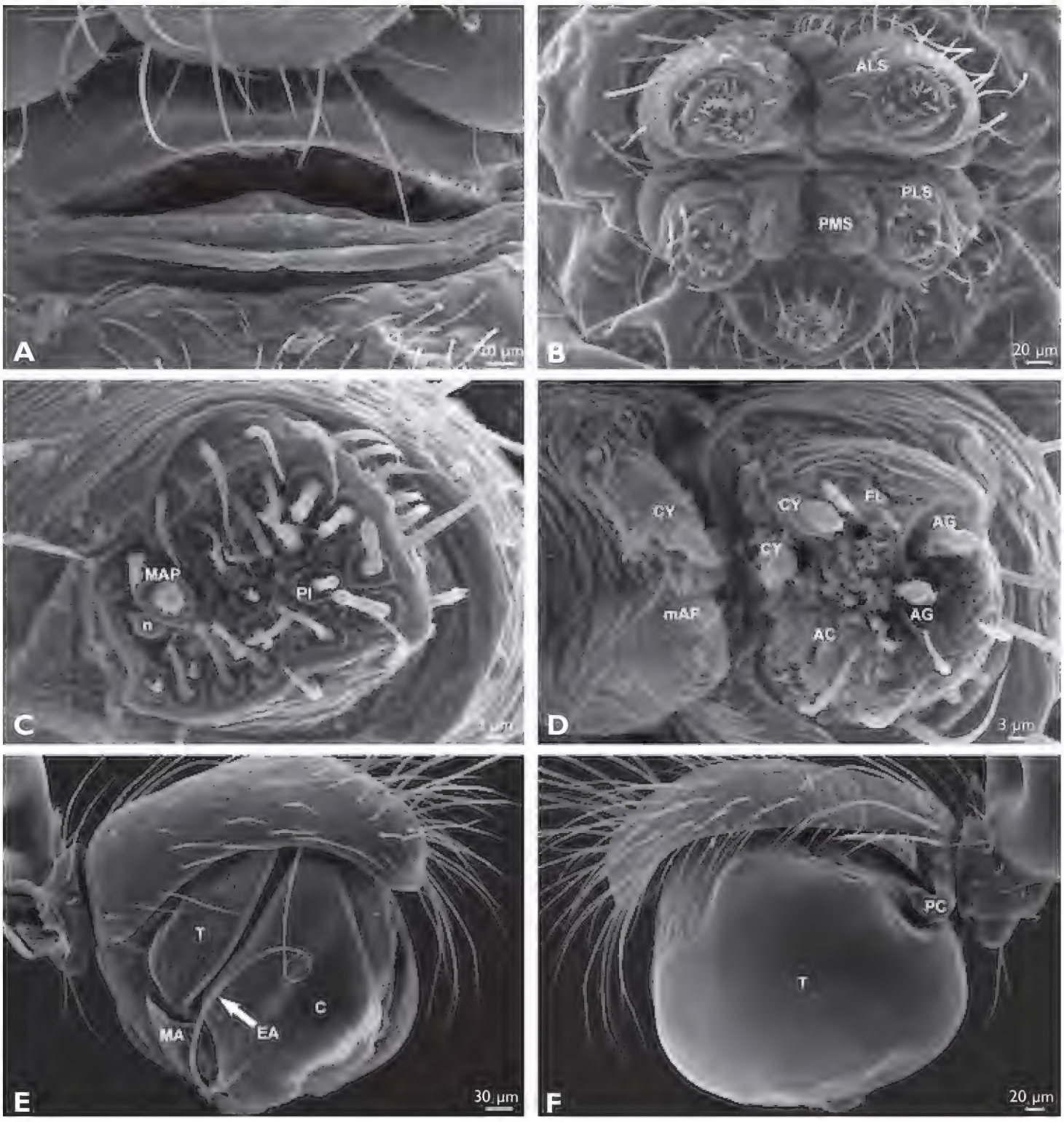


Figure 13. A-D, *Zoma dibaiyin* sp. n. from Pee He, SEM of female; E, F, *Wendilgarda muji* sp. n. from Xiao Hei Shan Nature Reserve, SEM of male palp. A, epigynum; B, spinnerets; C, ALS; D, PMS and PLS; E, prolateral; F, retrolateral. AC: aciniform gland spigot; AG: aggregate gland spigot; C: conductor; CY: cylindrical gland spigot; EA: embolic apophysis; FL: flagelliform gland spigot; MA: median apophysis; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PC: paracymbium; PI: piriform gland spigot; T: tegulum.

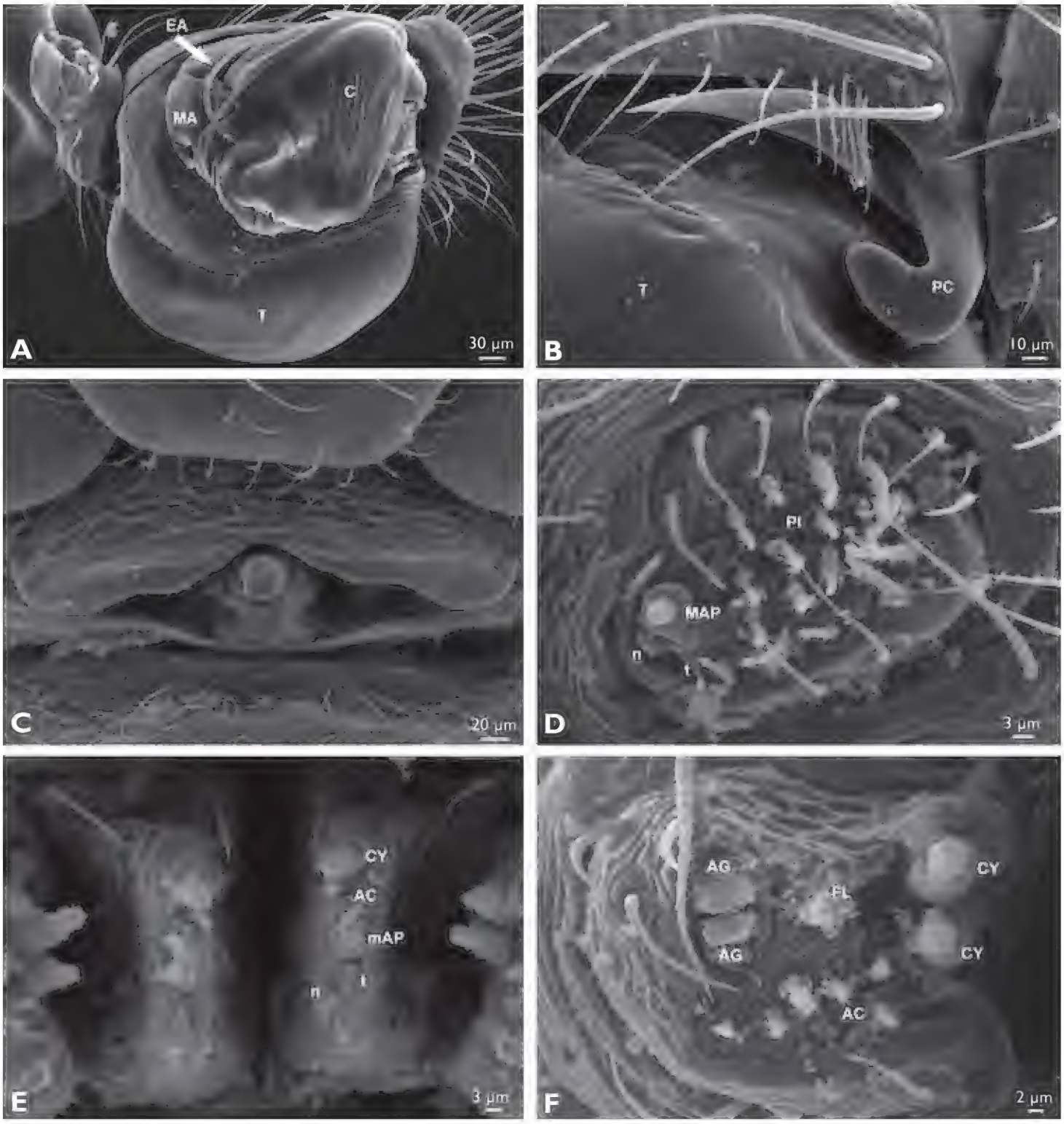


Figure 14. *Wendilgarda muji* sp. n. from Xiao Hei Shan Nature Reserve. A-B, SEM of male palp; C-F, SEM of female. A, ventral; B, retrolateral, detail showing paracymbium; C, epigynum; D, ALS; E, PMS; F, PLS. AC: aciniform gland spigot; AG: aggregate gland spigot; C: conductor; CY: cylindrical gland spigot; EA: embolic apophysis; FL: flagelliform gland spigot; MA: median apophysis; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PC: paracymbium; PI: piriform gland spigot; T: tegulum; t: tartipore.

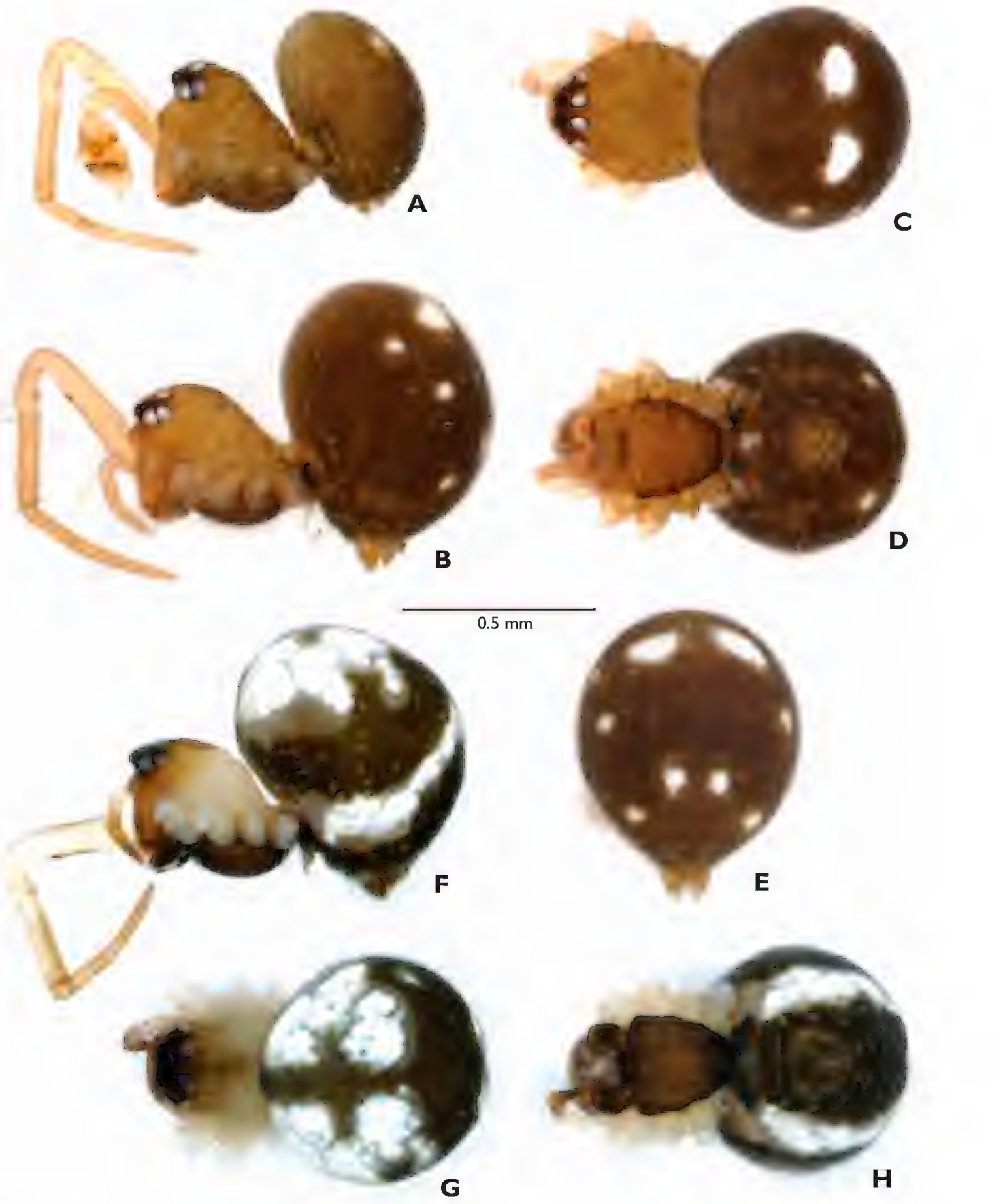


Figure 15. A-E, *Mysmena changouzi* sp. n. from No. 12 Bridge Camp area; F-H, *Mysmena jinlong* sp. n. from Danzhu He drainage. A, male, lateral; B, F, female, lateral; C, G, female, dorsal; D, H, female, ventral; E, female, posterior.

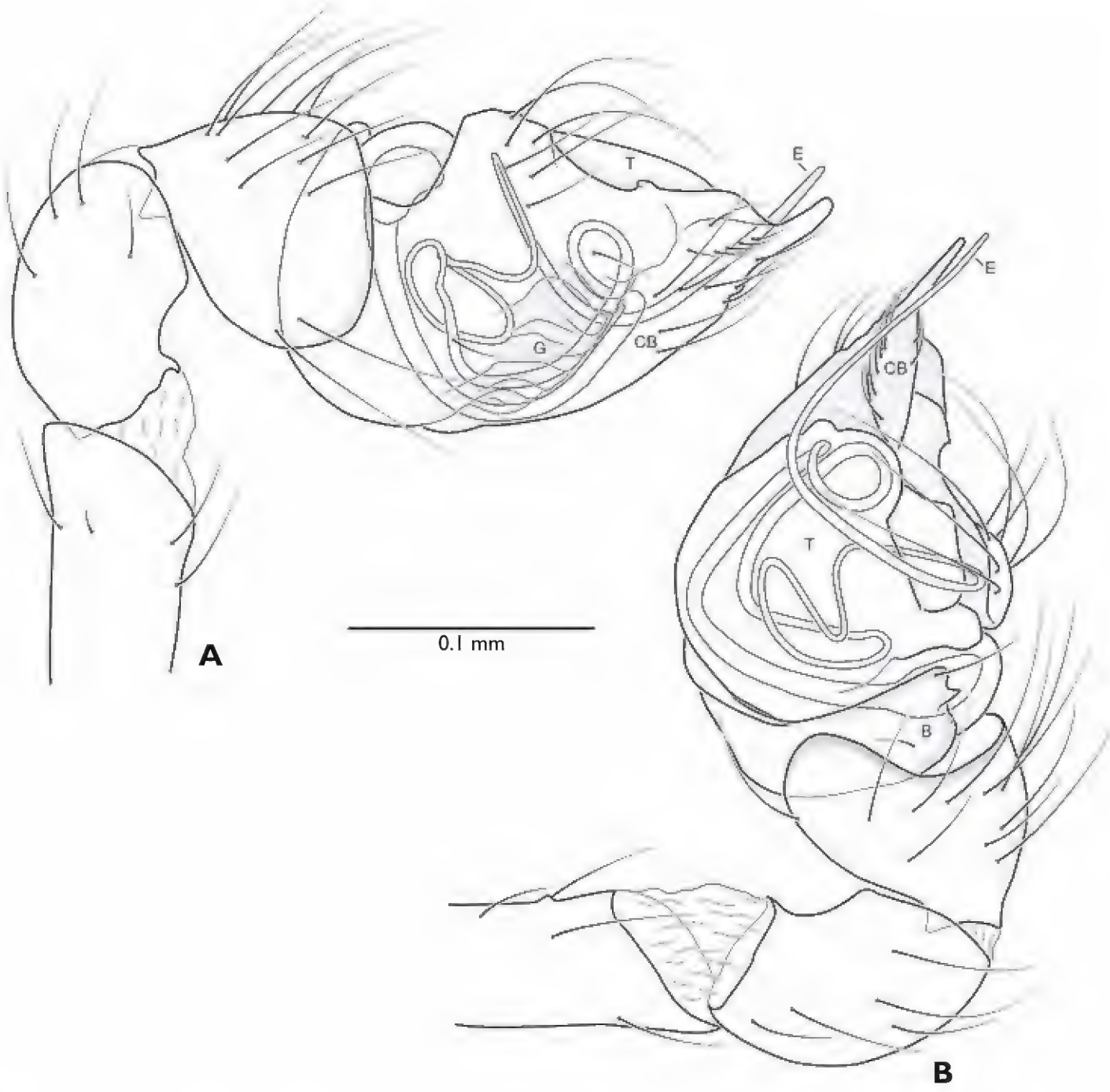


Figure 16. *Mysmena changouzi* sp. n. from No. 12 Bridge Camp area, male palp. A, prolateral; B, retrolateral. B: base of cymbium; CB: cymbium; E: embolus; G: cymbial groove; T: tegulum.

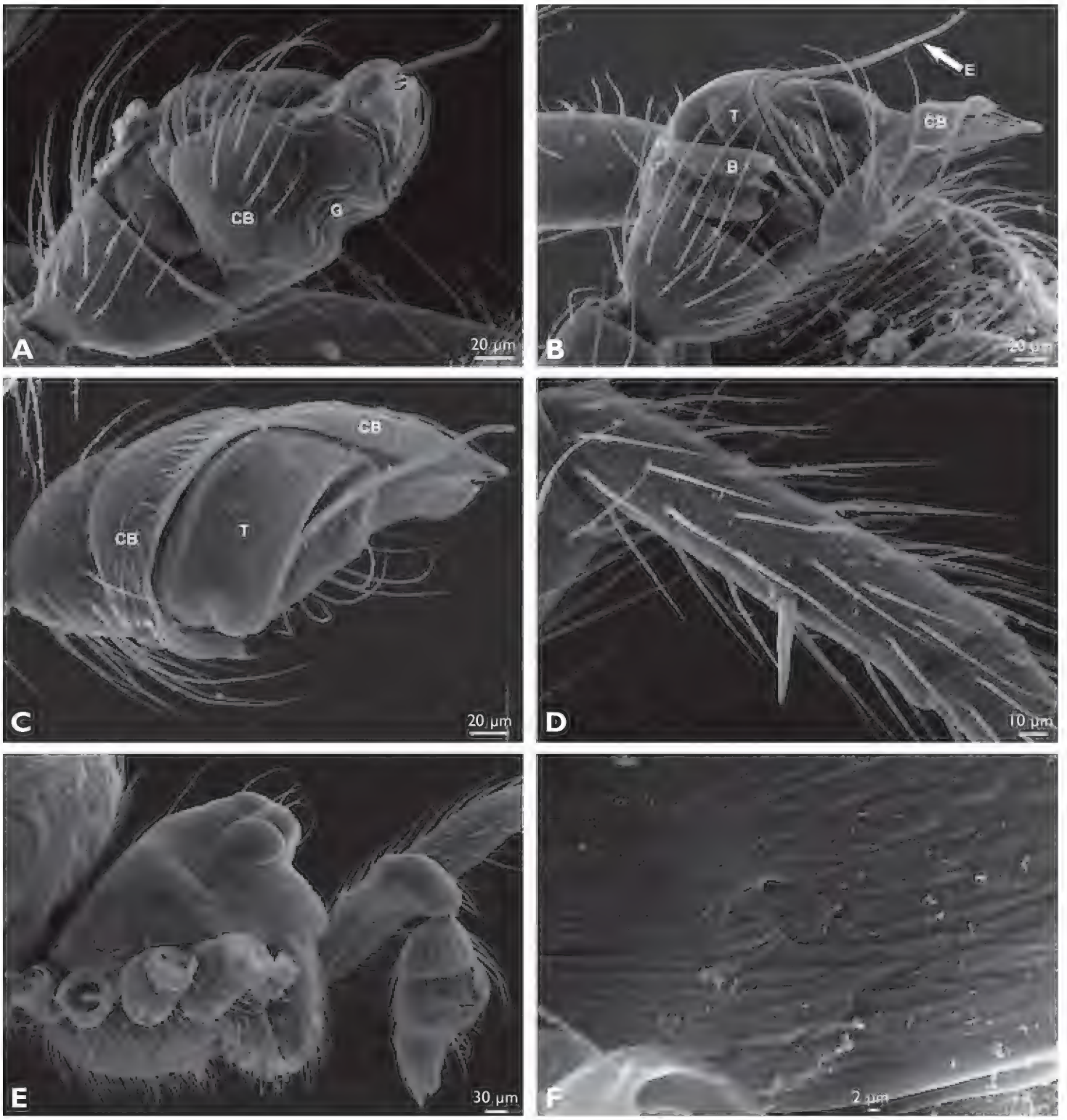


Figure 17. *Mysmena changouzi* sp. n. from No. 12 Bridge Camp area, SEM of male. A, male palp, prolateral; B, male palp, retrolateral; C, male palp, ventral; D, metatarsus I; E, prosoma, lateral; F, detail, carapace showing lateral pore. B: base of cymbium; CB: cymbium; E: embolus; G: cymbial groove; T: tegulum.

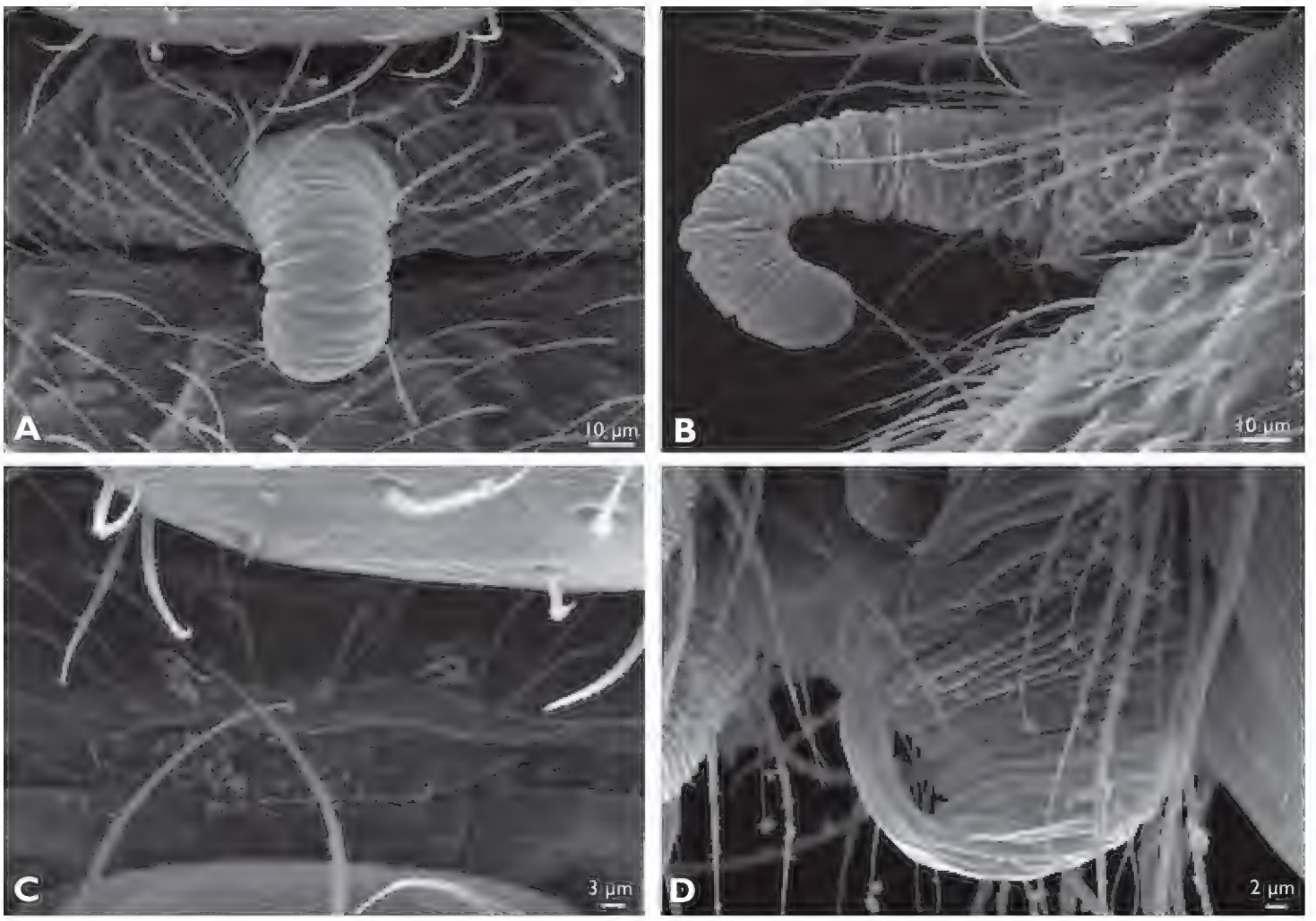


Figure 18. A-C, *Mysmena changouzi* sp. n. from No. 12 Bridge Camp area, SEM; D, *Mysmena jinlong* sp. n. from Danzhu He drainage, SEM of female. A, epigynum, ventral; B, epigynum, lateral, dorsal to the right; C, male epiandrous gland spigots; D, epigynum, lateral.

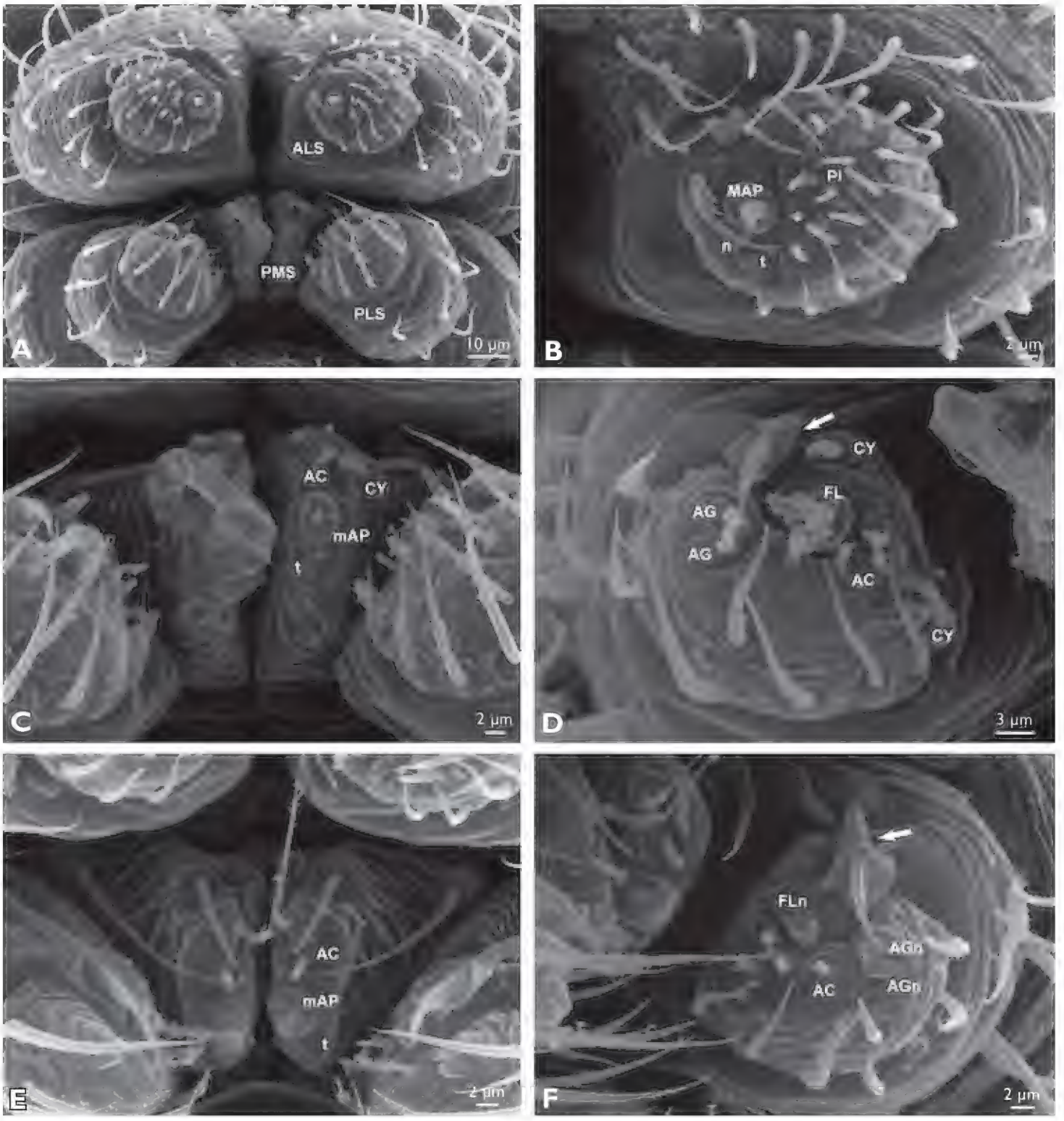


Figure 19. *Mysmena changouzi* sp. n. from No. 12 Bridge Camp area, SEM of spinnerets. A, female spinnerets; B, female ALS; C, female PMS; D, female PLS; E, male PMS; F, male PLS. AC: aciniform gland spigot; AG: aggregate gland spigot; AGn: aggregate gland spigot nubbin; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; FLn: flagelliform gland spigot nubbin; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore; arrow indicates modified PLS seta.

Figure 20. Webs of mysmenid spiders. A, *Mysmena changouzi* sp. n. from Danzhu He drainage, female; B-D, *Simaoa kavanaugh* sp. n. from Xiao Hei Shan Nature Reserve, female; E, *Simaoa kavanaugh* sp. n. from Nankang Yakou, female; F, *Simaoa yaojia* sp. n. from Yaojiaping, male and female.

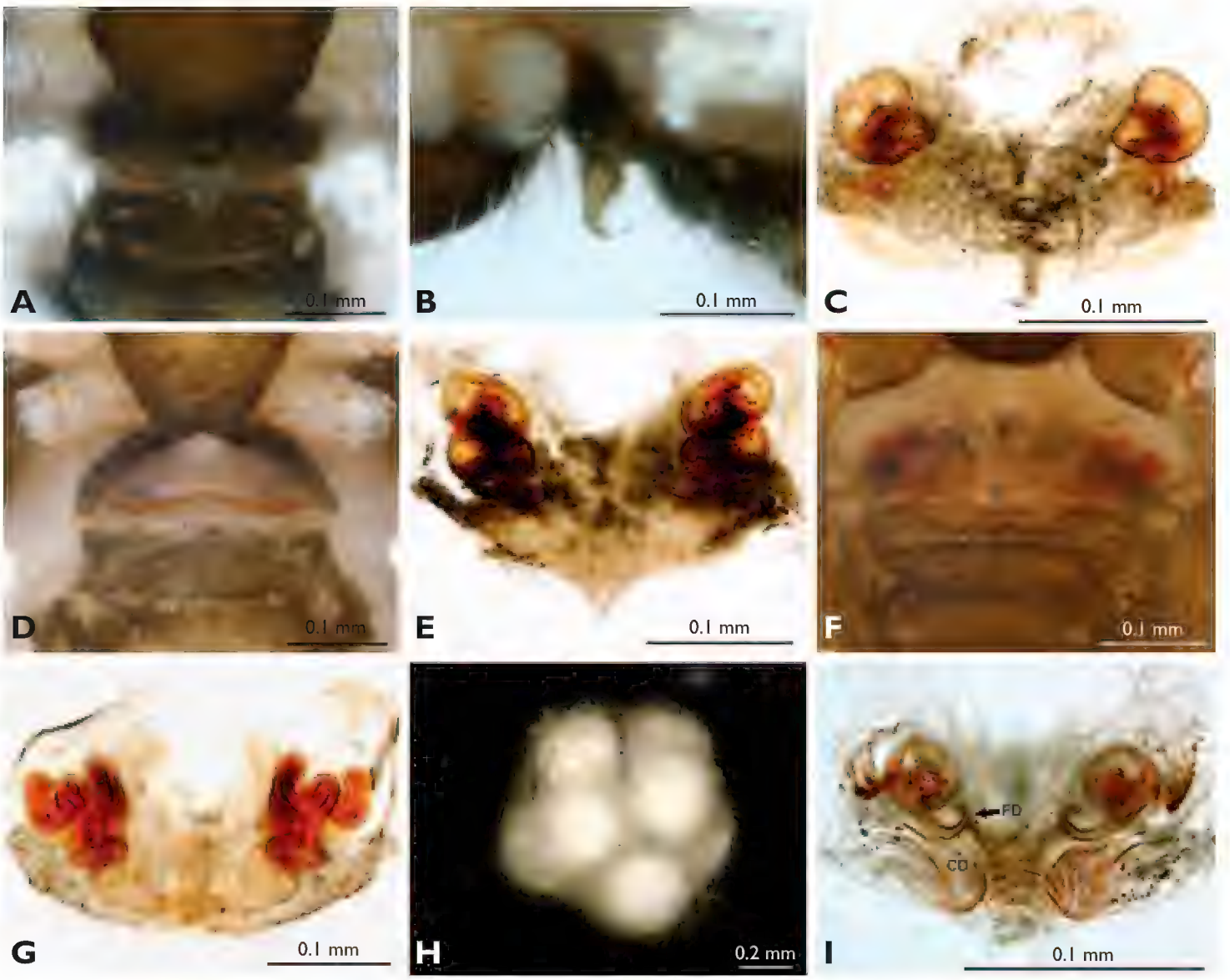


Figure 21. A-C, *Mysmena jinlong* sp. n. from Danzhu He drainage; D, E, *Mysmena bizi* sp. n. from Chang Yan He; F-H, *Mysmena goudao* sp. n. from QiQi He; I, *Mysmena haban* sp. n. from Haban Falls. A, D, F, epigynum, ventral view; B, epigynum, lateral view; C, E, G, I, cleared vulva, dorsal view; H, eggs.

Figure 22. *Mysmena bizi* sp. n. from Chang Yan He. A, male; B-E, female. A, B, lateral; C, dorsal; D, ventral; E, posterior.

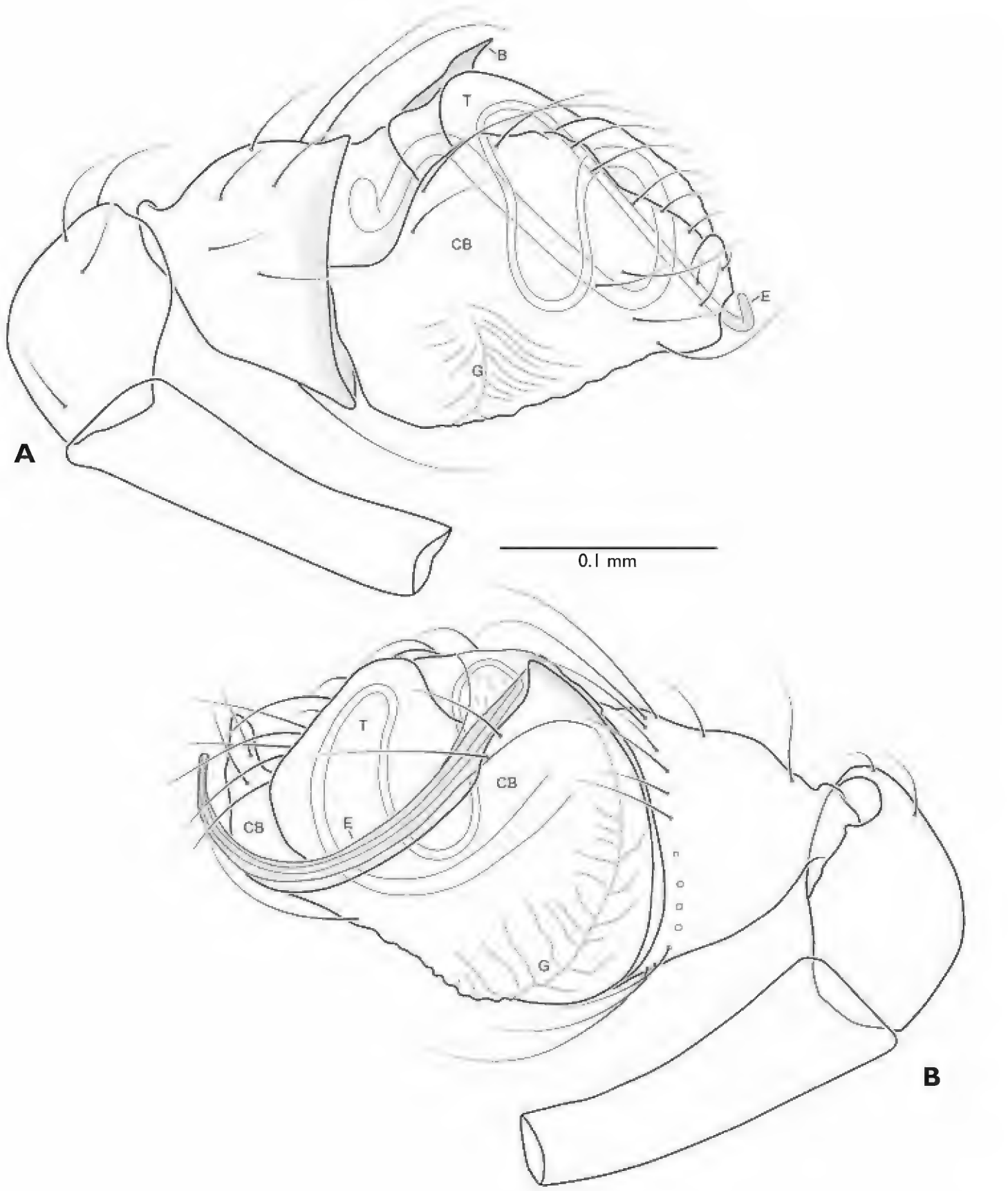


Figure 23. *Mysmena bizi* sp. n. from Chang Yan He, male palp. A, prolateral; B, retrolateral. B: base of cymbium; CB: cymbium; E: embolus; G: cymbial groove; T: tegulum.

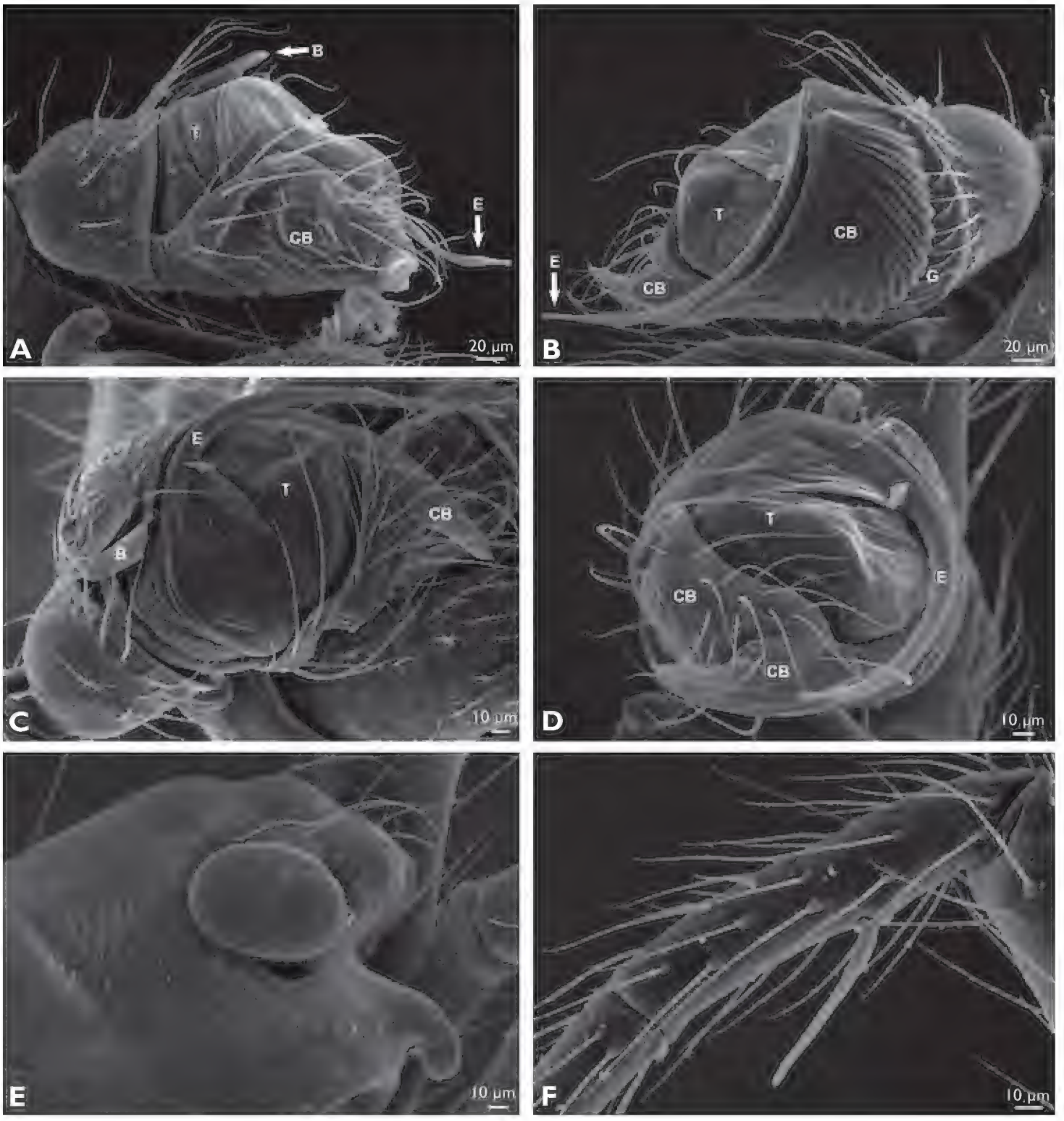


Figure 24. *Mysmena bizi* sp. n. from Chang Yan He, SEM of male. A, male palp, prolateral; B, male palp, retrolateral; C, male palp, dorsal; D, male palp, apical; E, prosoma, anterior lateral; F, metatarsus I. B: base of cymbium; CB: cymbium; E: embolus; G: cymbial groove; T: tegulum.

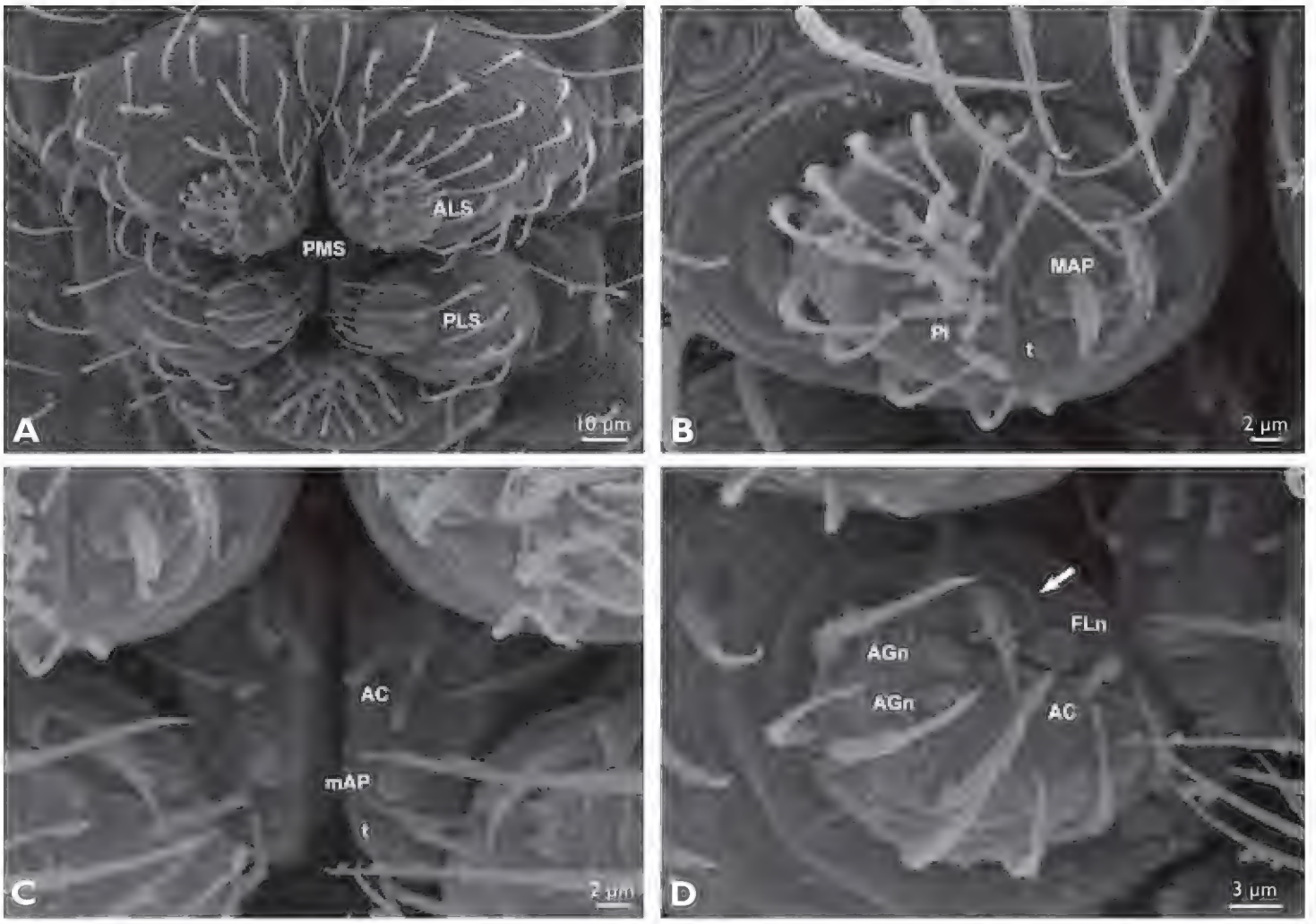


Figure 25. *Mysmena bizi* sp. n. from Chang Yan He, SEM. A-E, male; F, female. A, spinnerets; B, PLS; C, PMS; D, PLS, arrow indicates modified PLS seta; E, epiandrous gland spigots; F, epigynum. AC: aciniform gland spigot; AGn: aggregate gland spigot nubbin; ALS: anterior lateral spinneret; FLn: flagelliform gland spigot nubbin; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore; arrow indicates modified PLS seta.

Figure 26. Webs of mysmenid spiders. A, *Mysmena bizi* sp. n. from Pianma, female; B, *Gaoligonga changya* sp. n. from QiQi He, female with eggs; C, D, *Gaoligonga changya* sp. n. from Guocai He at Fucai, female with eggs.

Figure 27. A-E, *Mysmena goudao* sp. n. from QiQi He; F-H, *Mysmena shibali* sp. n. from Shibali. A, male; B-H, female. A, B, F, lateral; C, G, dorsal; D, H, ventral; E, posterior.

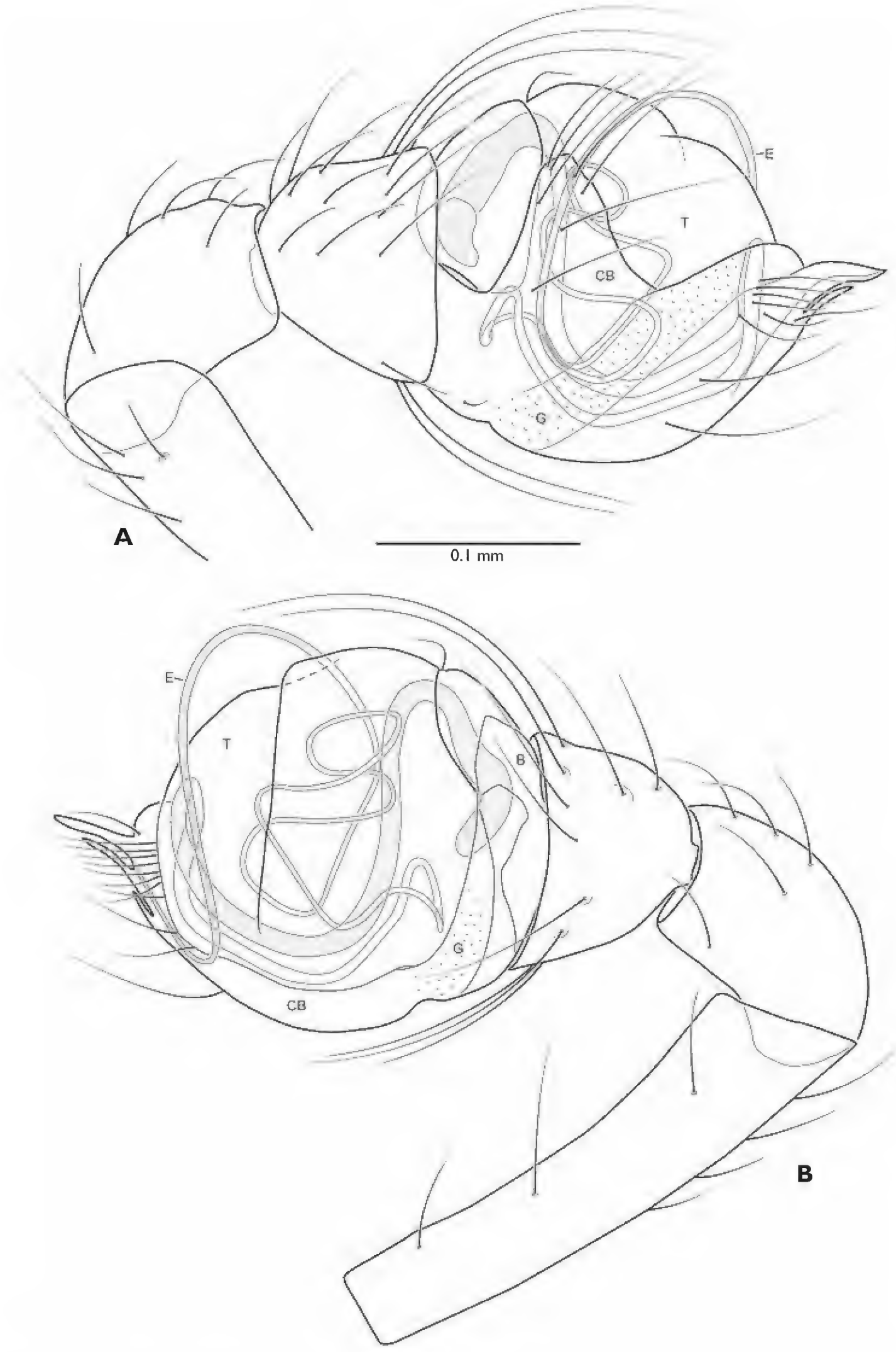


Figure 28. *Mysmena goudao* sp. n. from QiQi He, male palp. A, prolateral; B, retrolateral. B: base of cymbium; CB: cymbium; E: embolus; G: cymbial groove; T: tegulum.

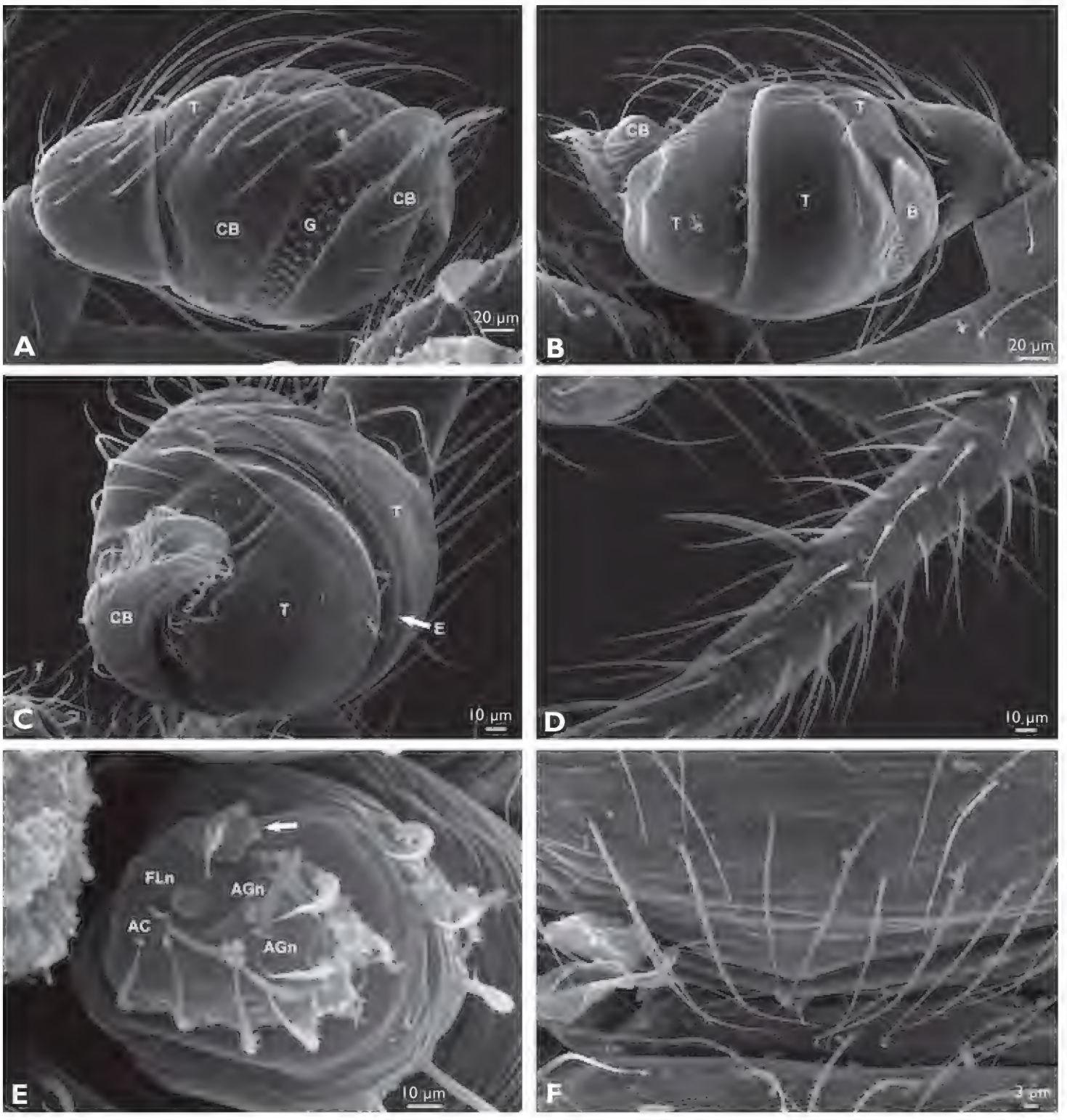


Figure 29. *Mysmena goudao* sp. n. from QiQi He, SEM. A-E, male; F, female. A, palp, prolateral; B, palp, retrolateral; C, palp, apical; D, metatarsus I; E, PLS, arrow indicates modified PLS seta; F, epigynum. AC: aciniform gland spigot; AGn: aggregate gland spigot nubbin; B: base of cymbium; CB: cymbium; E: embolus; FLn: flagelliform gland spigot nubbin; G: cymbial groove; T: tegulum.

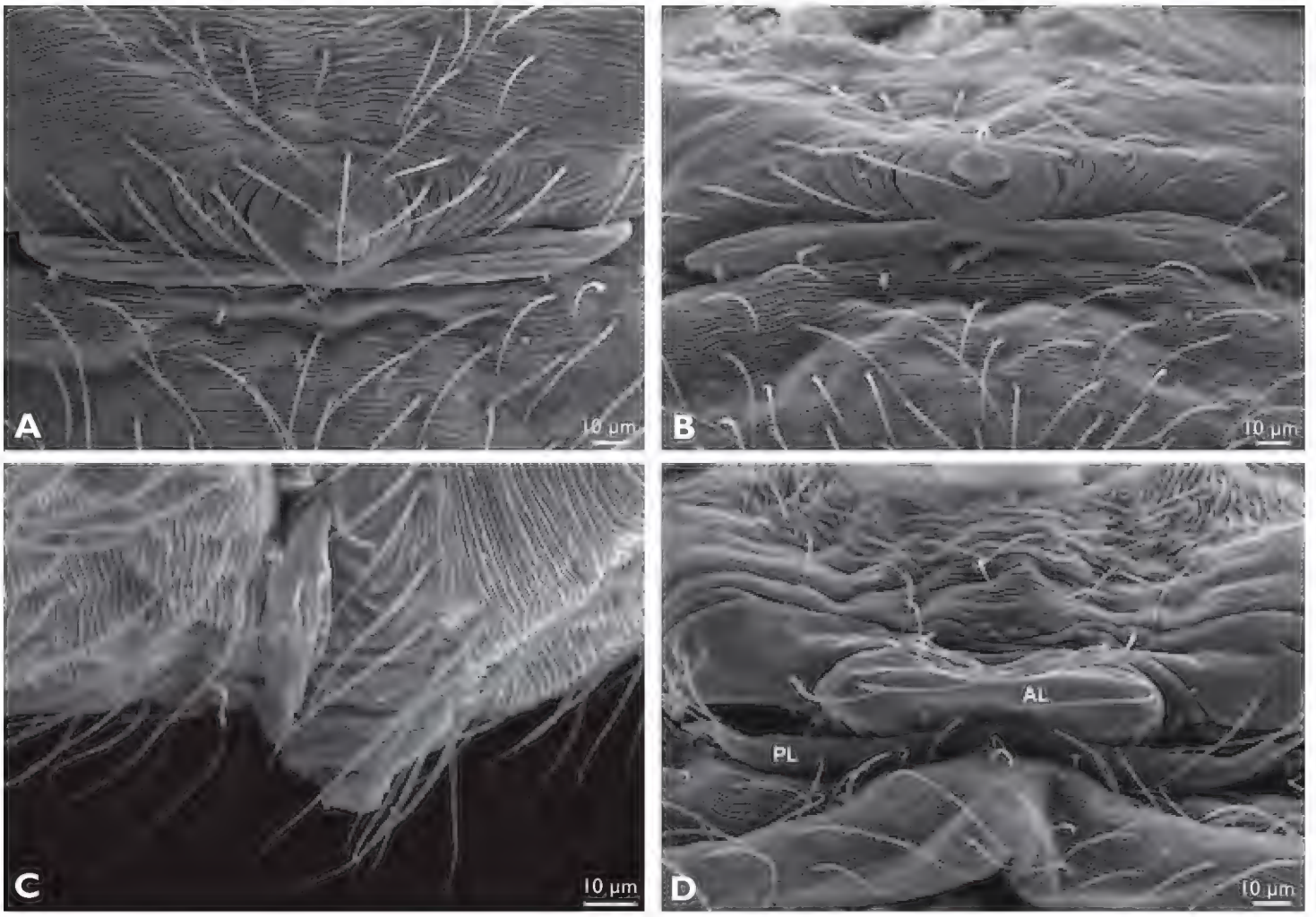


Figure 30. SEM, epigynum. A-C, *Mysmena shibali* sp. n. from Shibali; D, *Simaoa yaojia* sp. n. from Yaojiaping. A, D, ventral view; B, posterioventral view; C, lateral view. AL: anterior lobe; PL: posterior lobe.

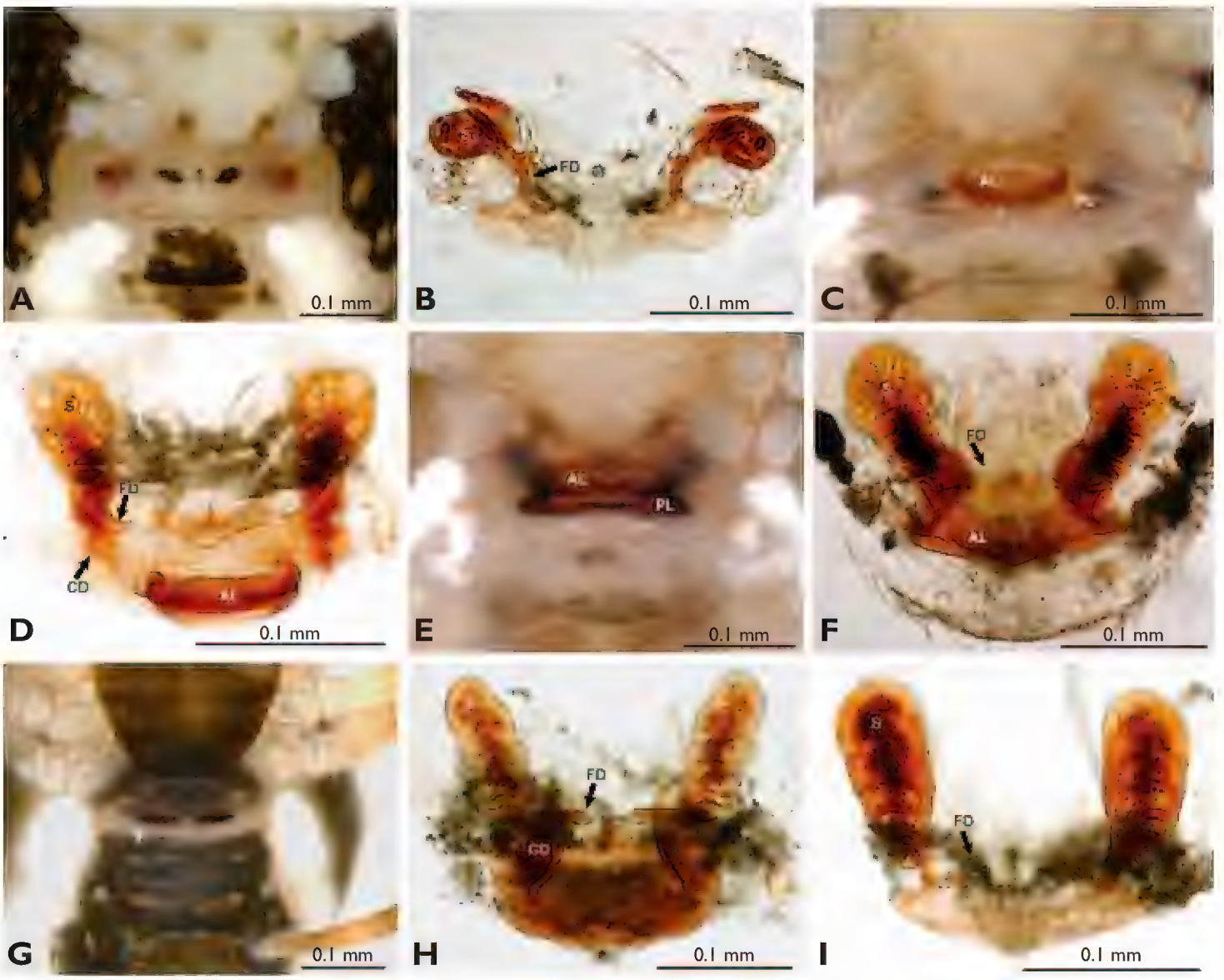
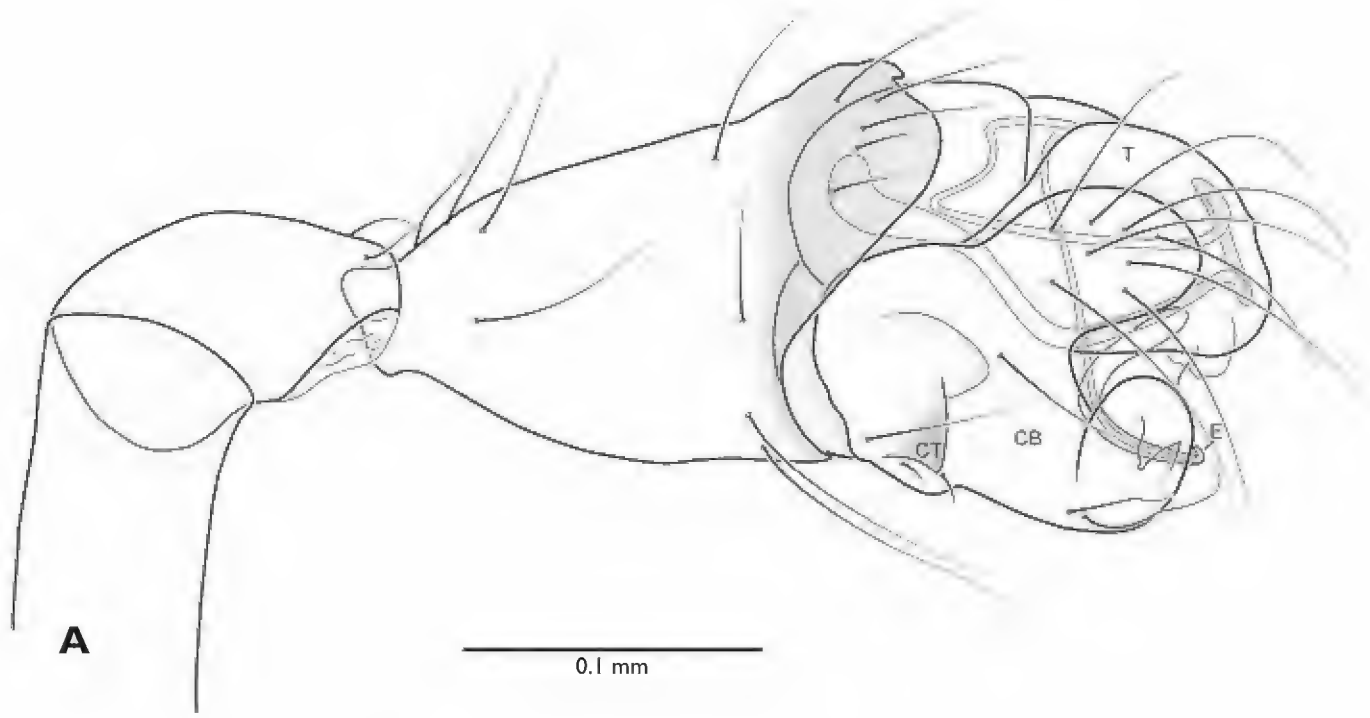


Figure 31. A, B, *Mysmena shibali* sp. n. from Shibali; C, D, *Simaoa yaojia* sp. n. from Yaojiaping; E, F; *Simaoa kavanaugh* sp. n. from Xiao Hei Shan Nature Reserve; G, H, *Simaoa maku* sp. n. from Maku ridge; I, *Simaoa bianjing* sp. n. from Haban Falls. A, C, E, G, epigynum, ventral veiw; B, D, F, H, I, cleared vulva, dorsal view. AL: anterior lobe; PL: posterior lobe.

Figure 32. *Simaoa yaojia* sp. n. from Yaojiaping. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, female, posterior.



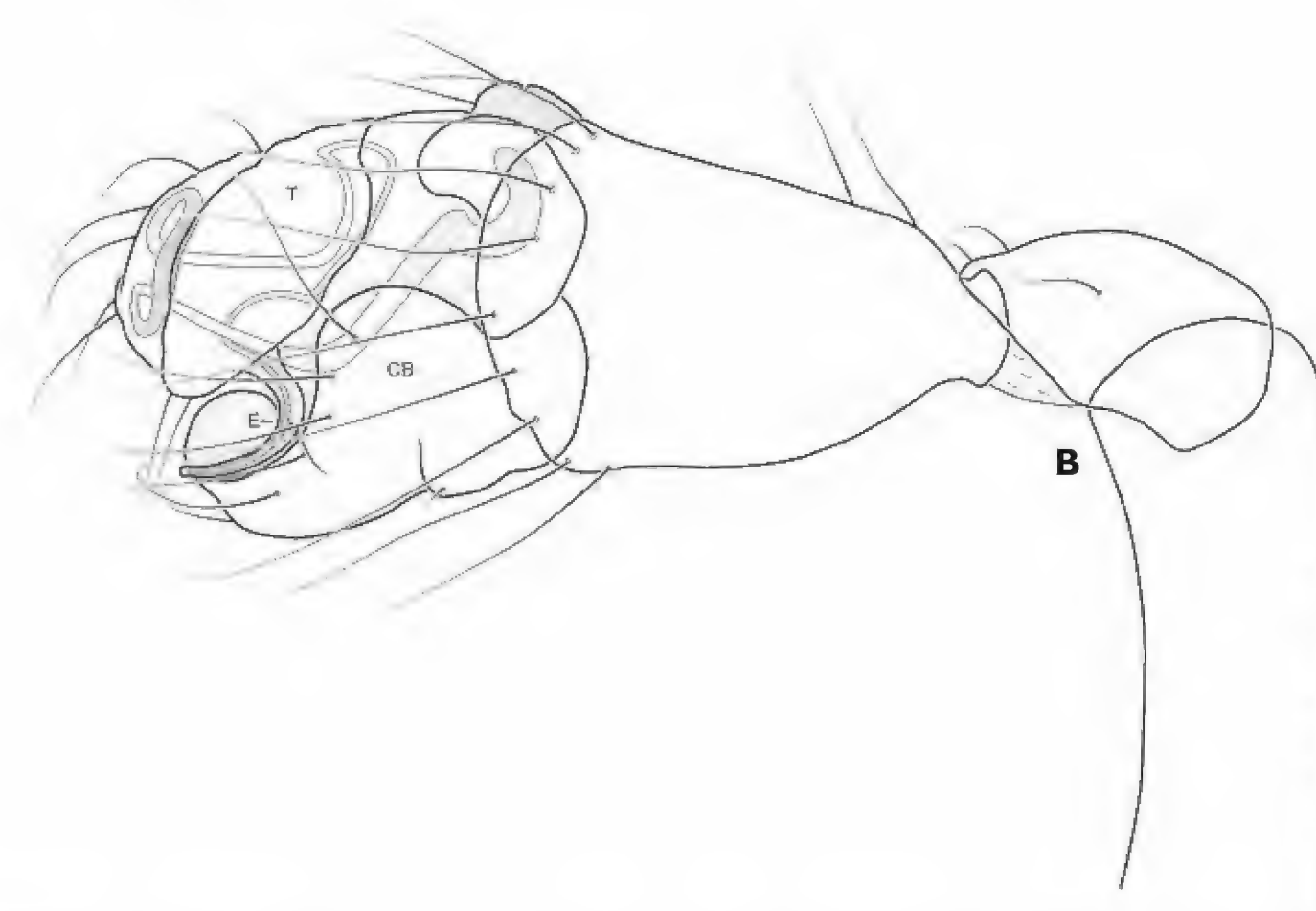


Figure 33. *Simaoa yaojia* sp. n. from Yaojiaping, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; T: tegulum.

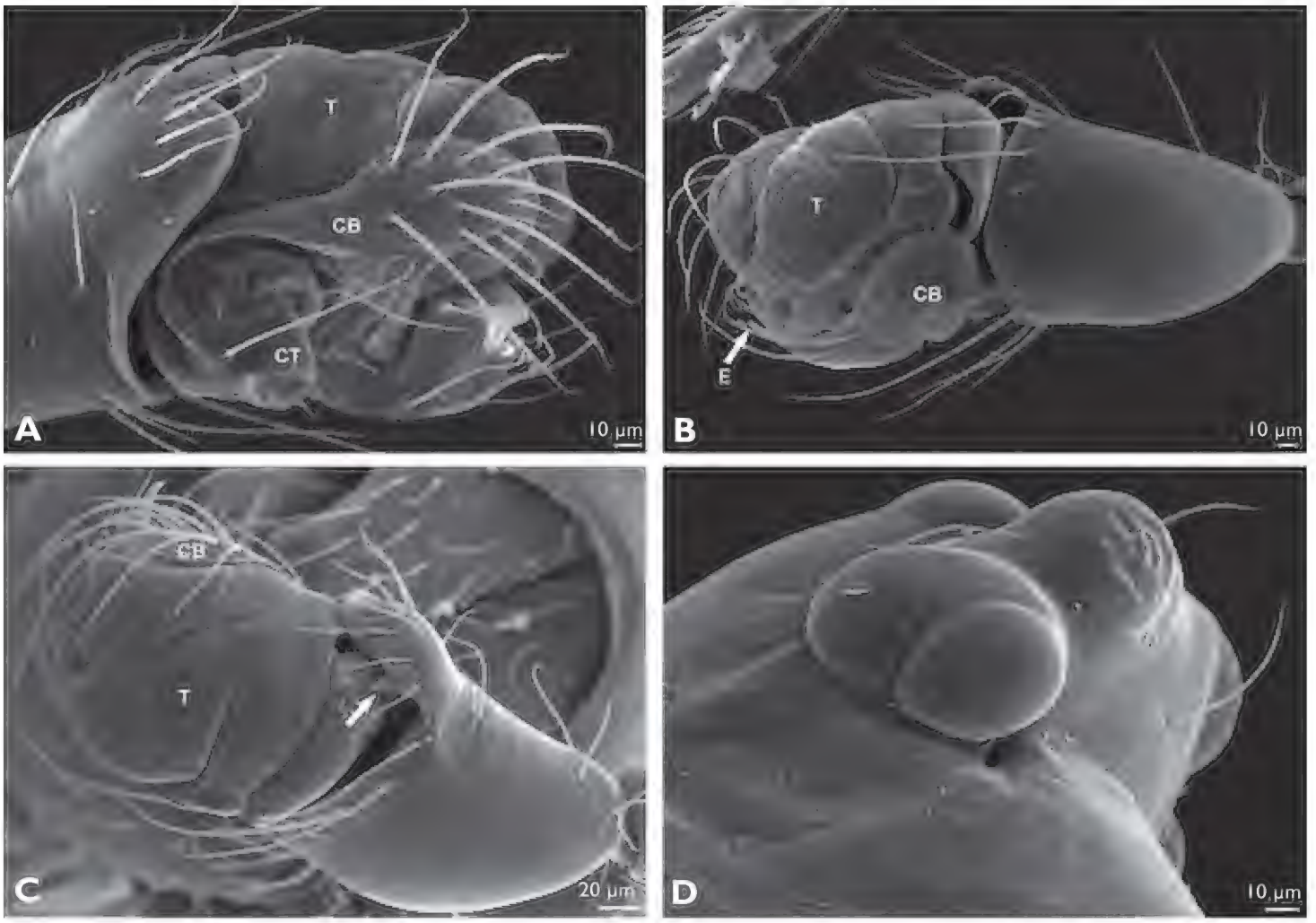


Figure 34. *Simaoa yaojia* sp. n. from Yaojiaping, SEM of male. A, male palp, prolateral; B, male palp, retrolateral; C, male palp, dorsal, arrow indicates tooth-like tibial process; D, prosoma, anterior lateral; E, metatarsus I; F, tibia I, prolateral. CB: cymbium; CT: cymbial tooth; E: embolus; T: tegulum.

Figure 35. *Simaoa kavanaugh* sp. n. from Xiao Hei Shan Nature Reserve. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, female, posterior.

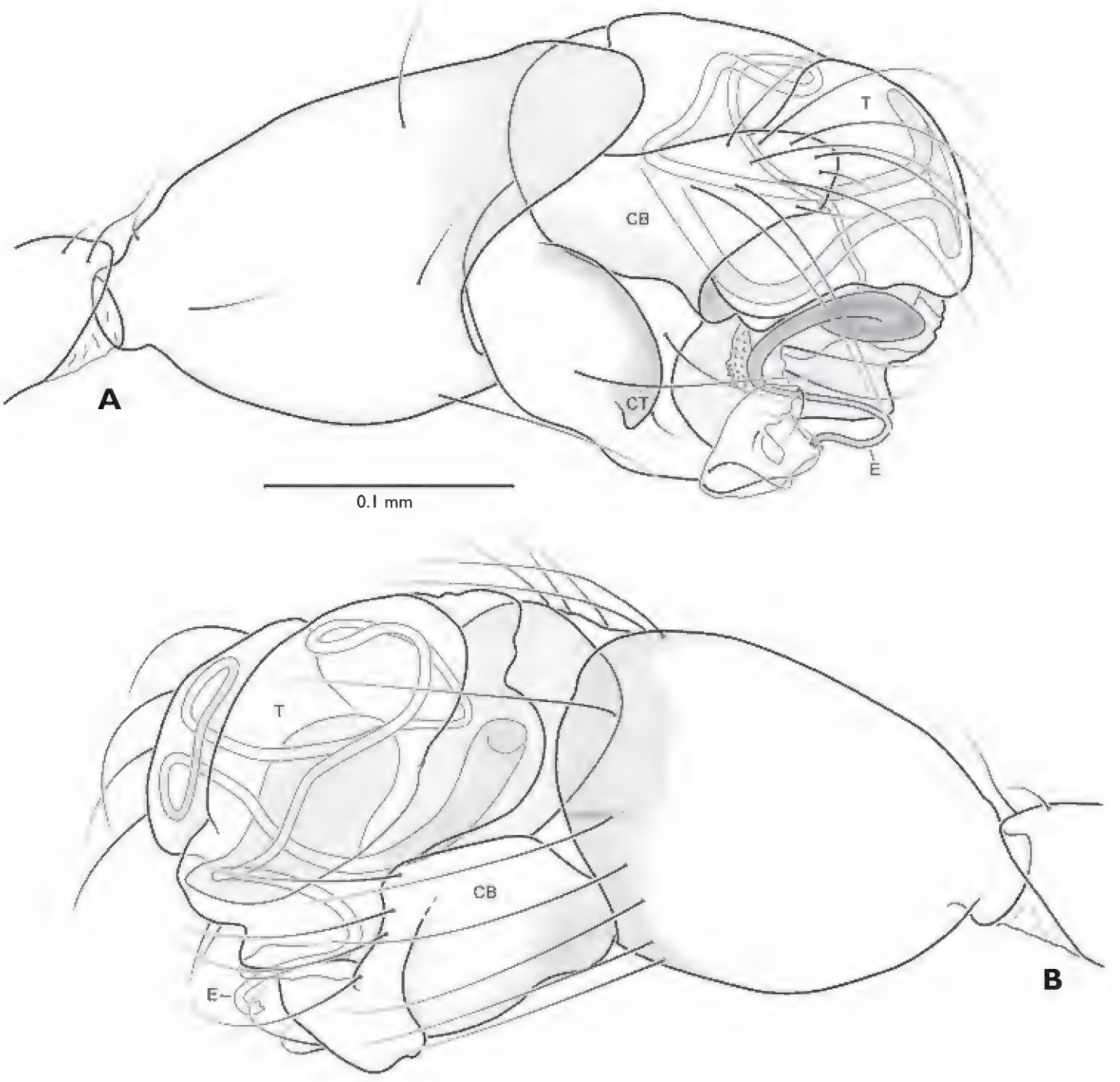


Figure 36. *Simaoa kavanaugh* sp. n. from Xiao Hei Shan Nature Reserve, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; T: tegulum.

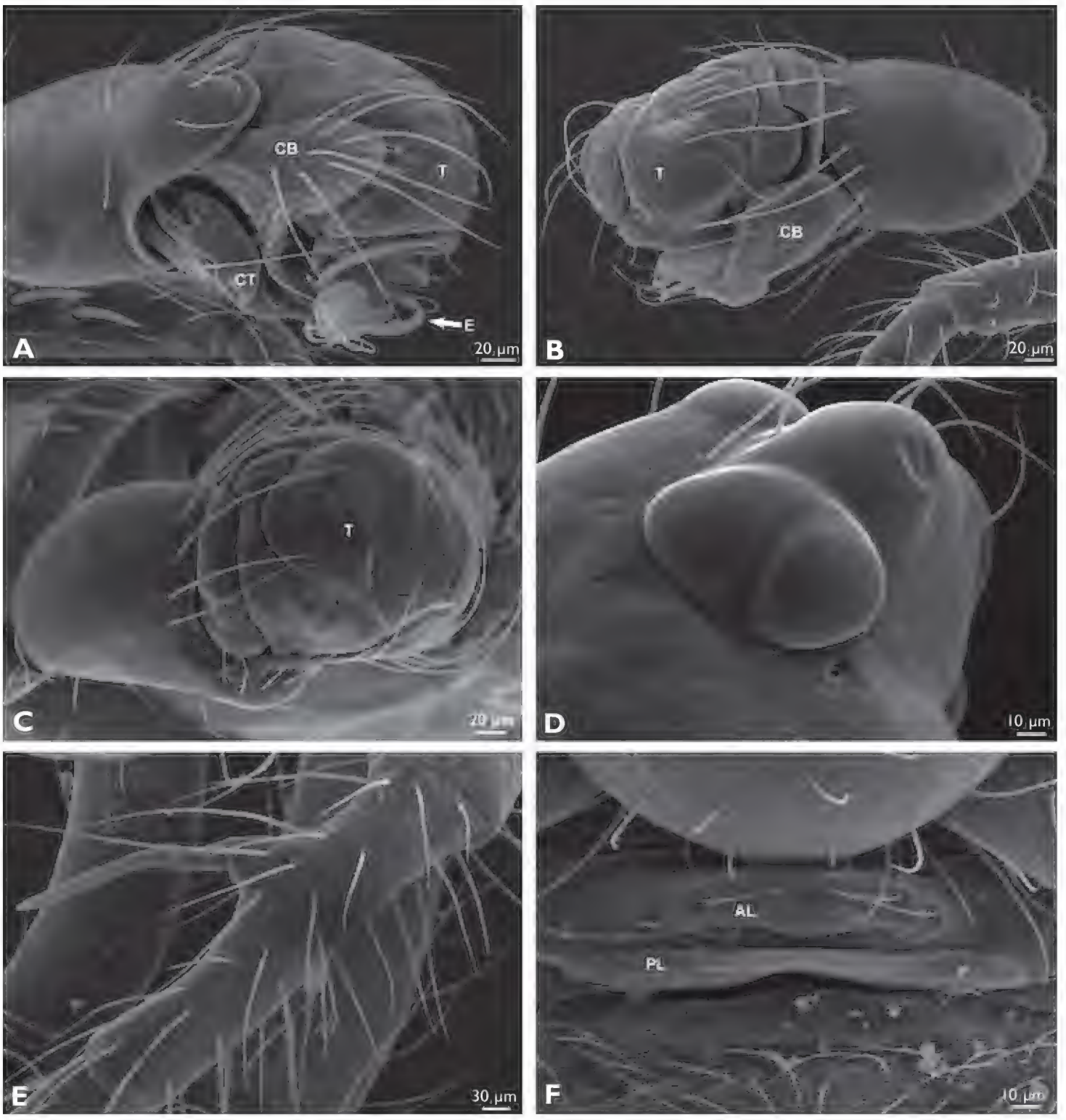


Figure 37. *Simaoa kavanaugh* sp. n. from Xiao Hei Shan Nature Reserve, SEM. A, male palp, prolateral; B, male palp, retrolateral; C, male palp, dorsal; D, prosoma, anterior lateral; E, metatarsus I; F, epigynum. AL: anterior lobe; CB: cymbium; CT: cymbial tooth; E: embolus; PL: posterior lobe; T: tegulum.

Figure 38. *Gaoligonga changya* sp. n. A, male from Lishadi; B-E, female from QiQi He. A, B, lateral; C, dorsal; D, ventral; E, posterior.

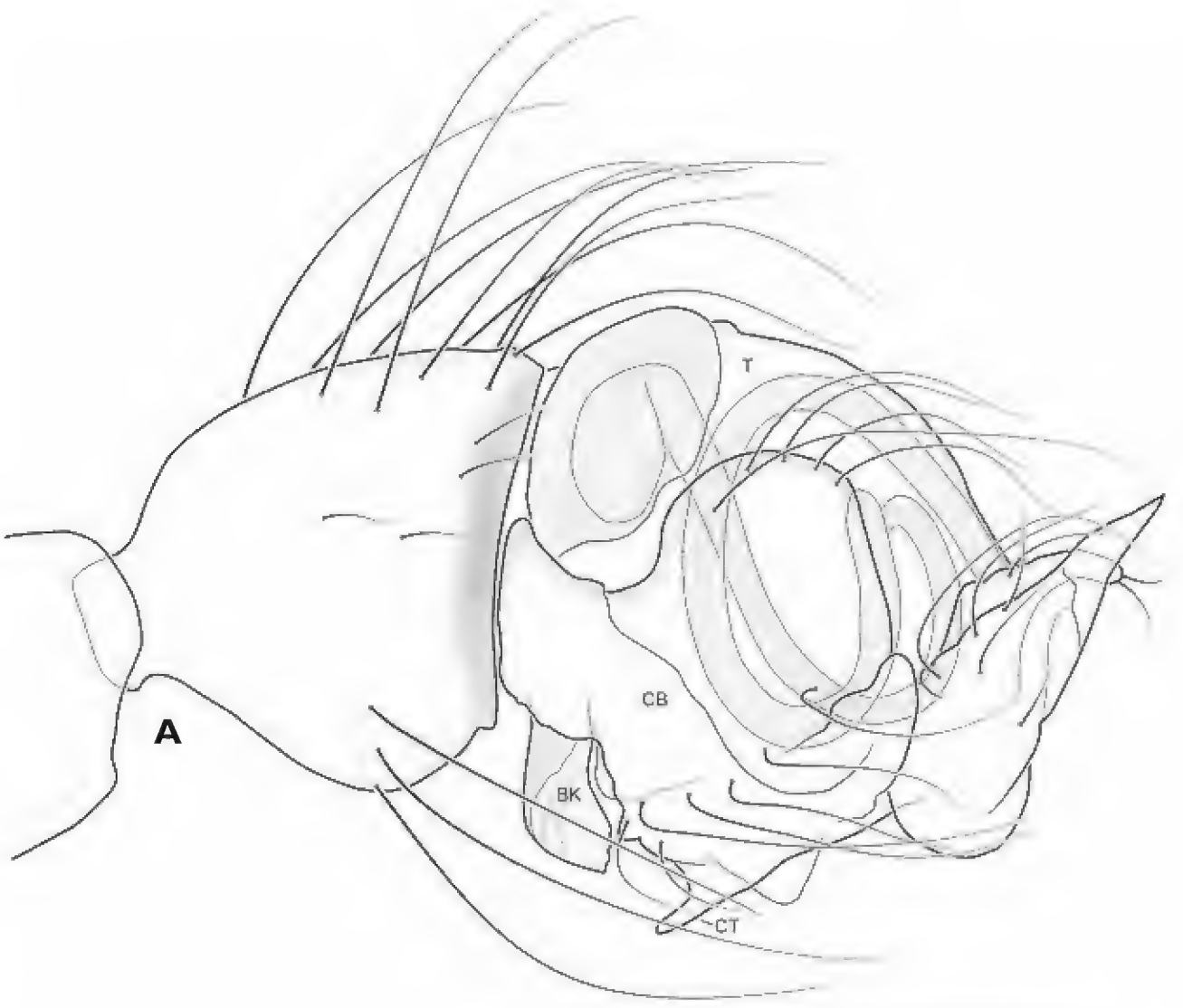


Figure 39. *Gaoligonga changya* sp. n. from Lishadi, male palp. A, prolateral; B, retrolateral. BK: basal keel; CB: cymbium; CT: cymbial tooth; MK: median keel; T: tegulum.

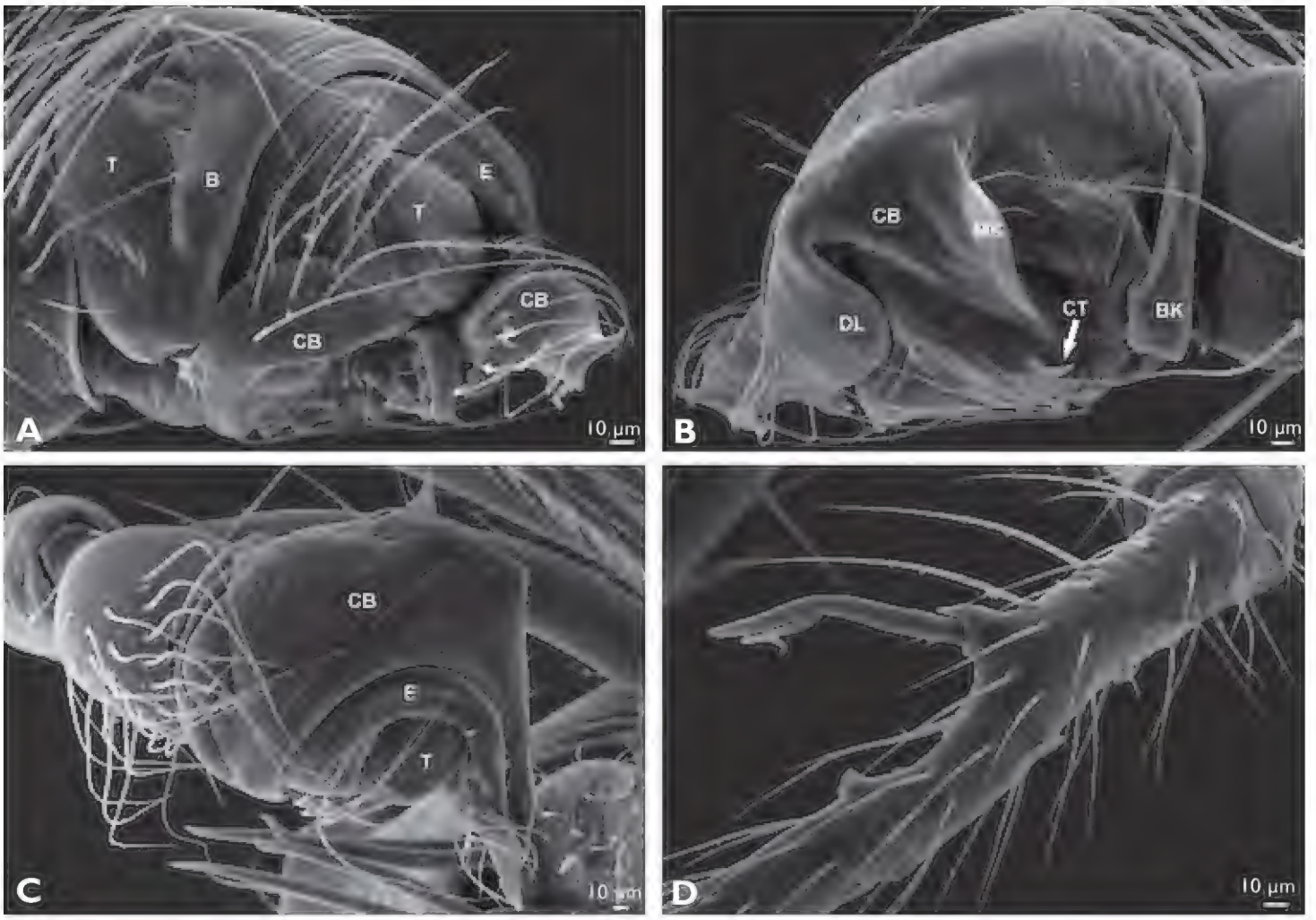


Figure 40. *Gaoligonga changya* sp. n. from Lishadi, SEM of male. A, palp, prolateral; B, palp, retrolateral; C, palp, dorsal; D, metatarsus I; E, prosoma, lateral; F, prosoma, dorsal. B: base of cymbium; BK: basal keel; CB: cymbium; CT: cymbial tooth; DL: distal lobe; E: embolus; MK: median keel; T: tegulum.

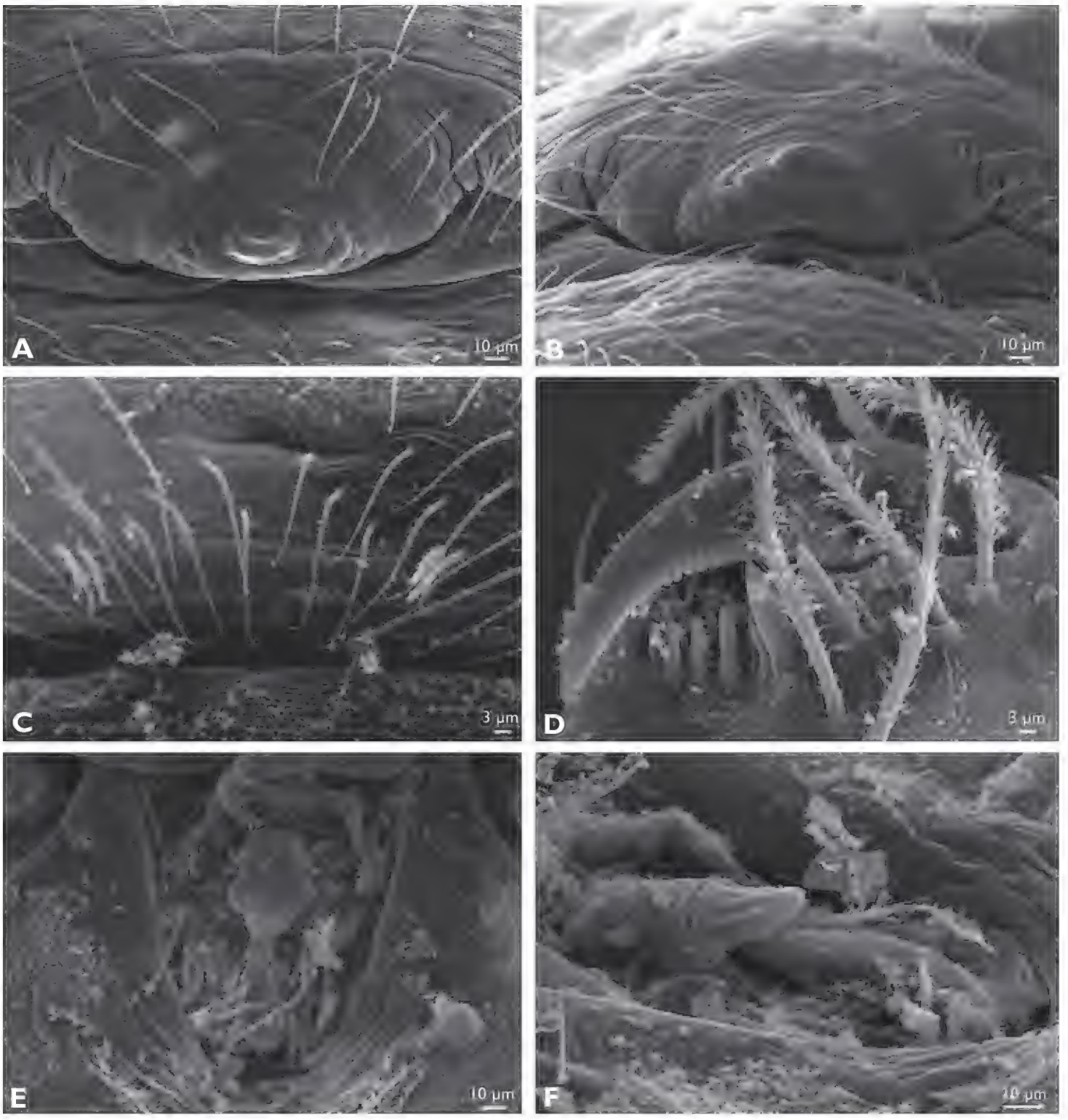


Figure 41. *Gaoligonga changya* sp. n., SEM. A, epigynum, ventral; B, epigynum, posterior; C, epiandrous gland spigots; D, fang and cheliceral teeth, female; E, labrum, anterior, female; F, labrum, lateral, female.

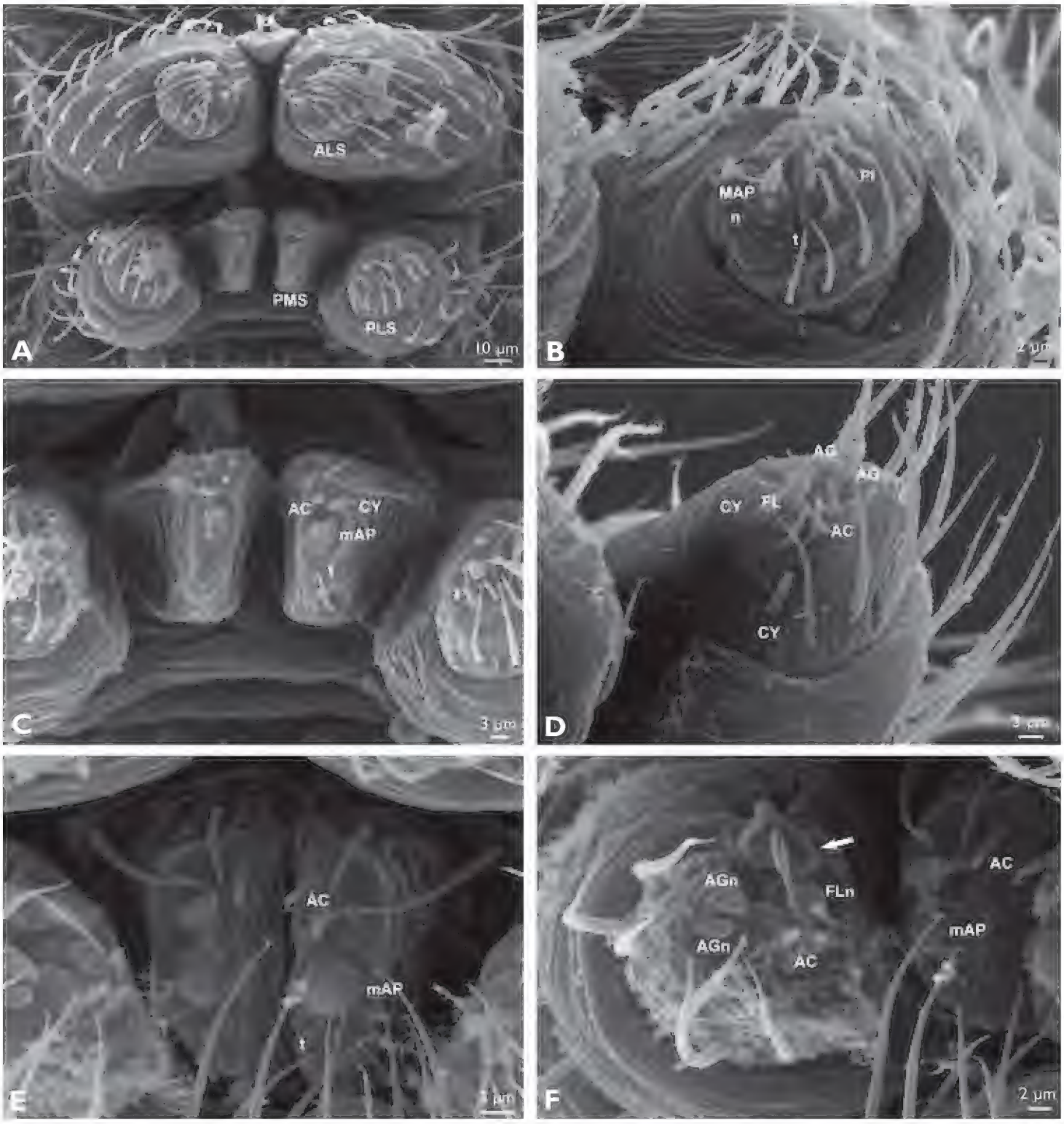


Figure 42. *Gaoligonga changya* sp. n., SEM. A-D, female; E, F, male. A, spinnerets; B, ALS; C, E, PMS; D, F, PLS, arrow indicates modified PLS seta. AC: aciniform gland spigot; AG: aggregate gland spigot; AGn: aggregate gland spigot nubbin; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; FLn: flagelliform gland spigot nubbin; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

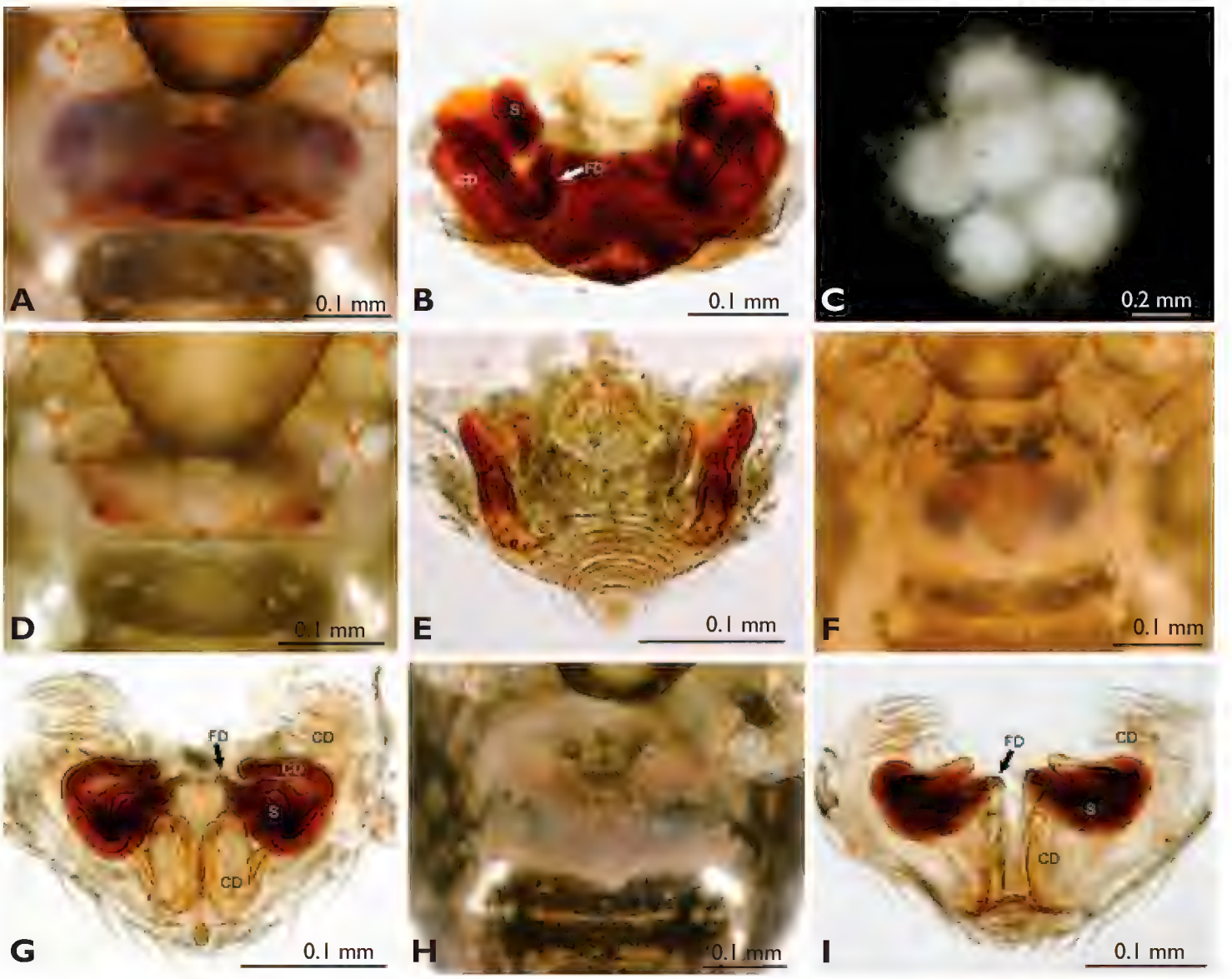


Figure 43. A-C, *Gaoligonga changya* sp. n. from QiQi He; D, E, *Gaoligonga zhusun* sp. n. from Shilajia village; F-G, *Mosu nujiang* sp. n. from Pee He; H, I, *Mosu huogou* sp. n. from Haban Falls. A, D, F, H, epigynum, ventral view; B, E, G, I, cleared vulva, dorsal view; C, eggs. CD: copulatory duct; FD: fertilization duct; S, spermatheca.

Figure 44. *Gaoligonga zhusun* sp. n. from Shilajia village. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, female, posterior.

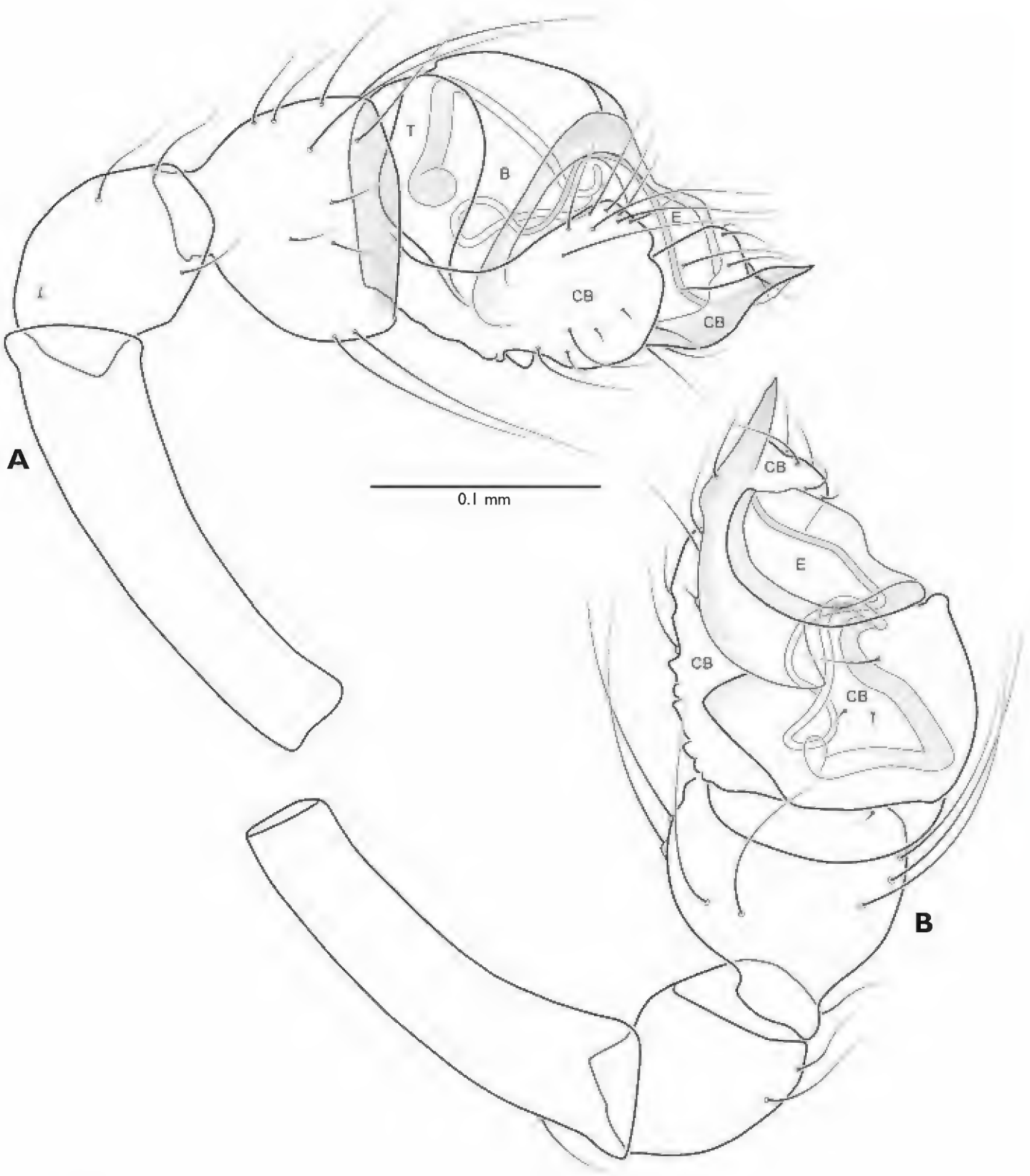


Figure 45. *Gaoligonga zhusun* sp. n. from Shilajia village, male palp. A, prolateral; B, retrolateral. B: base of cymbium; CB: cymbium; E: embolus; T: tegulum.

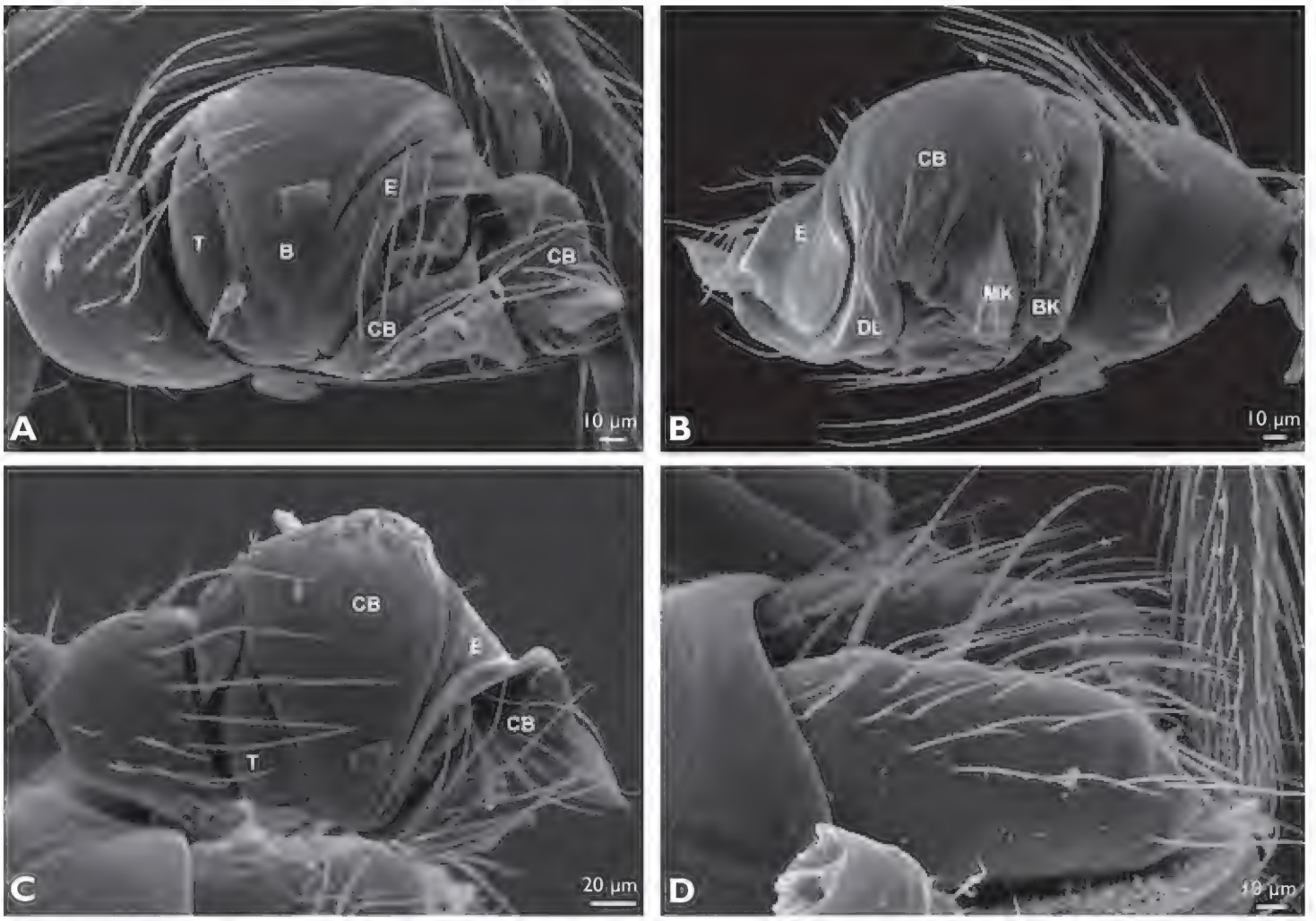


Figure 46. *Gaoligonga zhusun* sp. n. from Shilajia village, SEM of male. A, palp, prolateral; B, palp, retrolateral; C, palp, dorsal; D, chelicerae, lateral, dorsal to the left; E, prosoma, lateral; F, metatarsus I. B: base of cymbium; BK: basal keel; CB: cymbium; DL: distal lobe; E: embolus; MK: median keel; T: tegulum.

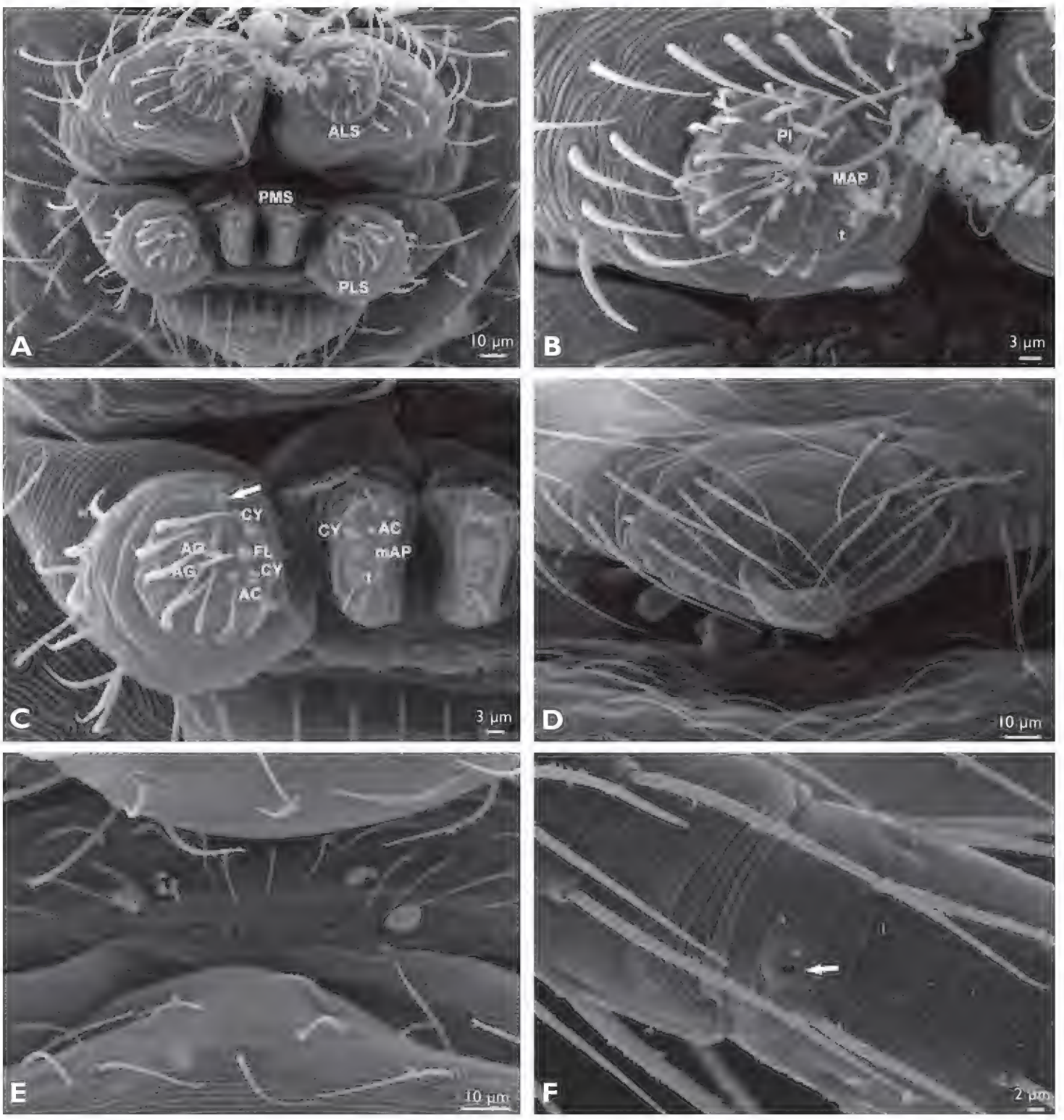


Figure 47. *Gaoligonga zhusun* sp. n. from Shilajia village, SEM. A-D, F, female; E, male. A, spinnerets; B, ALS; C, PLS and PMS, arrow indicates modified PLS seta; D, epigynum; E, epiandrous gland spigots; F, metatarsus-tarsus joint, arrow indicates tarsal organ. AC: aciniform gland spigot; AG: aggregate gland spigot; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

Figure 48. *Chanea suukyii* sp. n. from Maku ridge. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral.

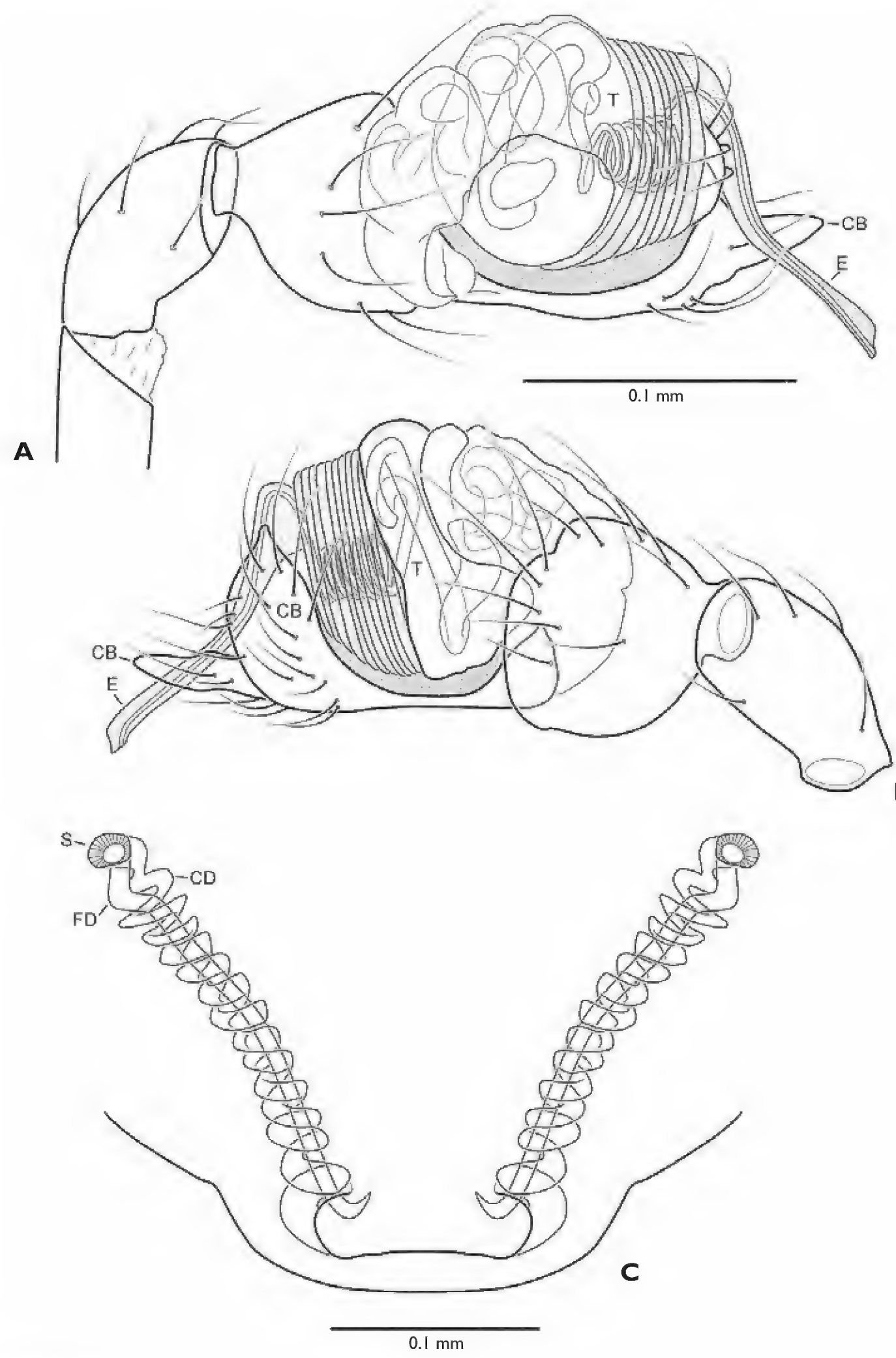


Figure 49. *Chanea suukyii* sp. n. from Maku ridge. A, male palp, prolateral; B, male palp, retrolateral; C, cleared vulva, dorsal view. CB: cymbium; CD: copulatory duct; E: embolus; FD: fertilization duct; S: spermatheca; T: tegulum.

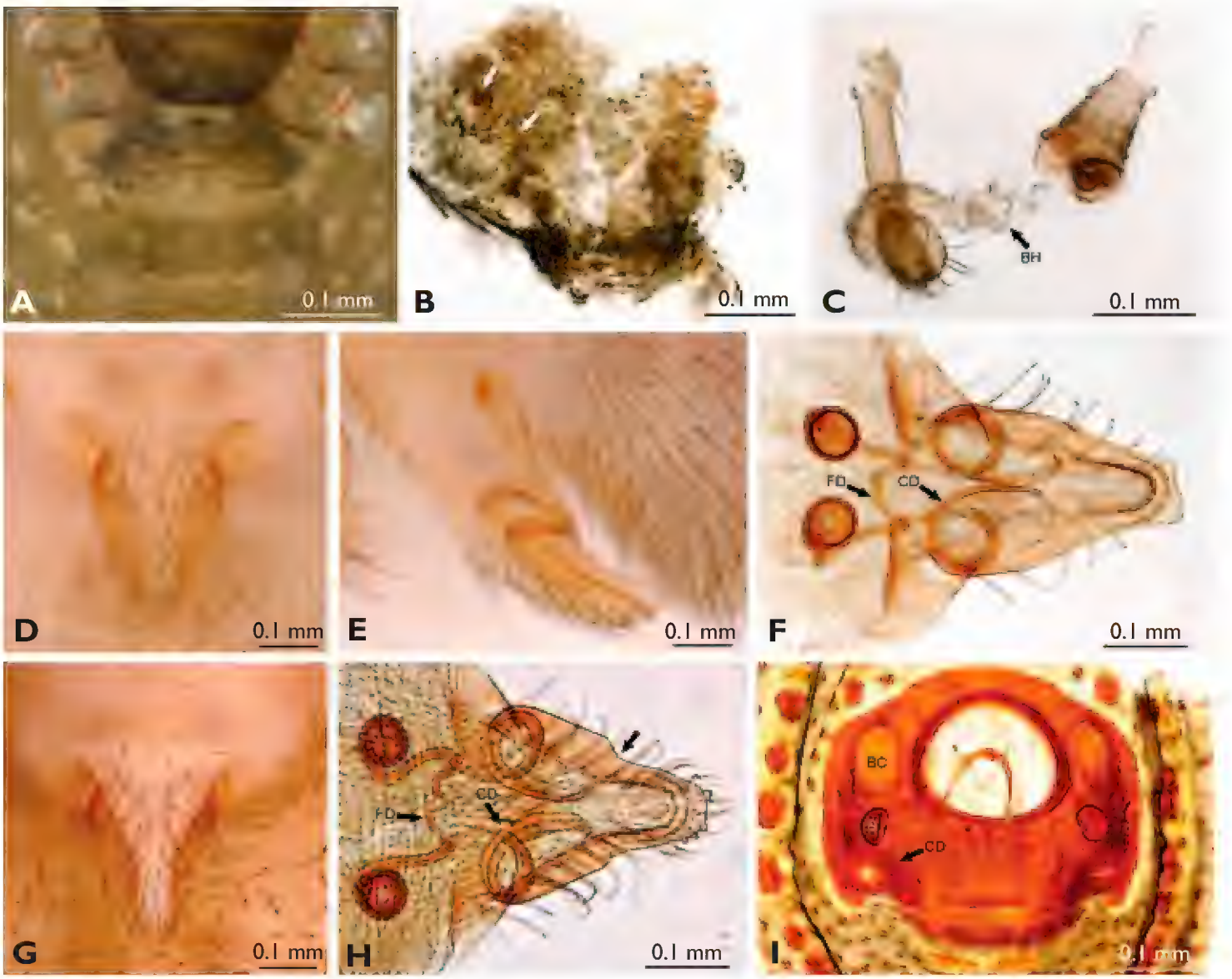


Figure 50. A-C, *Chanea suukyii* sp. n. from Maku ridge; D-F, *Maymena paquini* sp. n. from Wayala Ku cave; G, H; *Maymena kehen* sp. n. from Lishadi, unlabeled arrow indicates diagnostic notch in scape; I, *Gaiziapis zhizhuba* sp. n. from Nankang Yakou. A, D, G, epigynum, ventral veiw; B, F, H, I, cleared vulva, dorsal view; C, male palp, cleared and expanded. BC: booklung cover; BH: basal hematodocha; CD: copulatory duct; FD: fertilization duct; S: spermatheca.

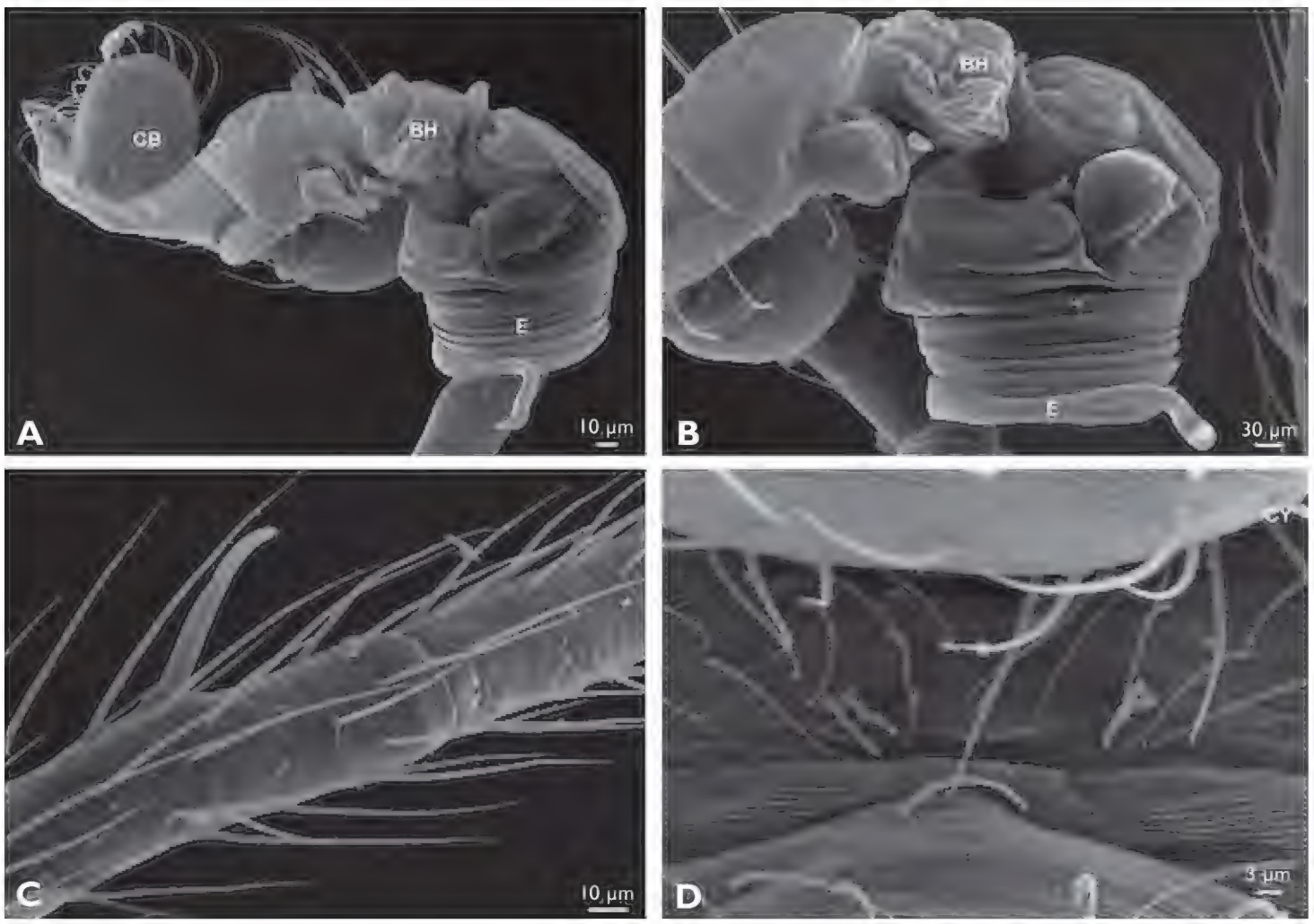


Figure 51. *Chanea suukyii* sp. n. from Maku ridge, SEM of male. A, B, palp, expanded, retrolateral; C, metatarsus I; D, epiandrous gland spigots. BH: basal hematodocha; CB: cymbium; E: embolus.

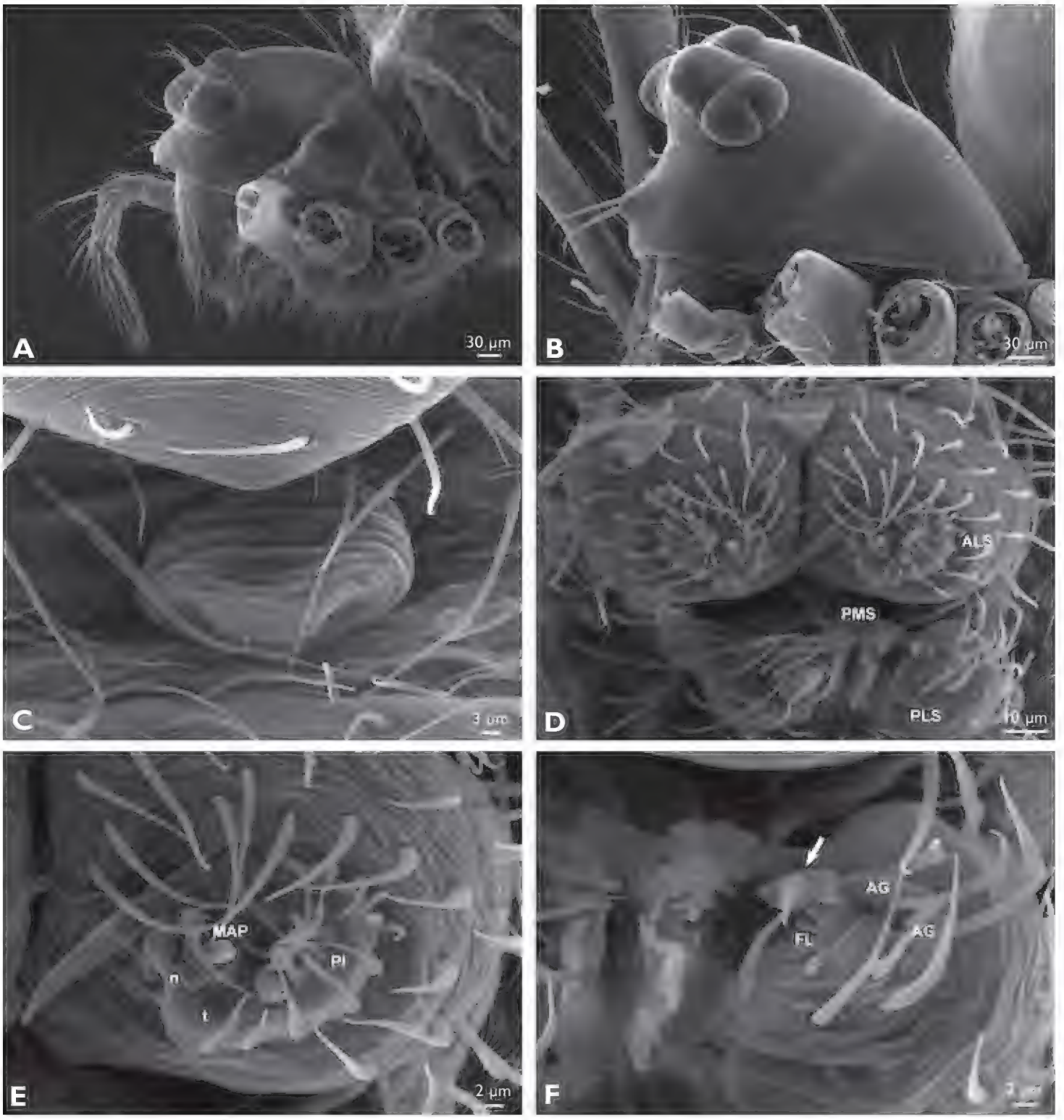


Figure 52. *Chanea suukyii* sp. n. from Maku ridge, SEM. A, female prosoma, lateral; B, male prosoma, lateral; C, epigynum; D, female spinnerets; E, female ALS; F, female PLS, arrow indicates modified PLS seta. AG: aggregate gland spigot; ALS: anterior lateral spinneret; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

Figure 53. *Maymena paquini* sp. n. from Wayala Ku cave. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, female, posterior.

Figure 54. *Maymena paquini* sp. n. from Wayala Ku cave, male palp. A, prolateral; B, retrolateral. CB: cymbium; E: embolus; T: tegulum.

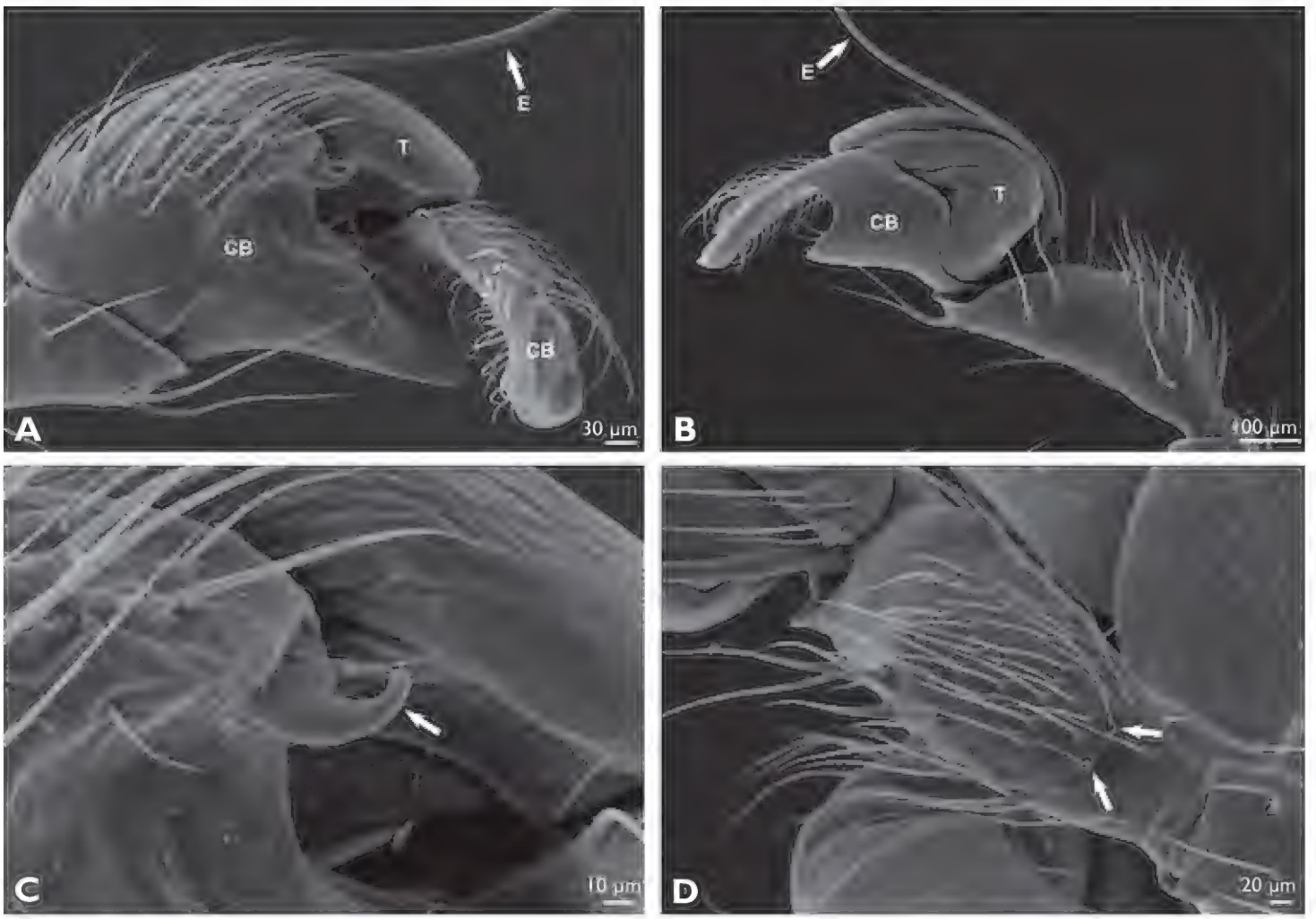


Figure 55. *Maymena paquini* sp. n. from Wayala Ku cave, SEM of male. A, palp, prolateral; B, palp, retrolateral; C, palp, prolateral detail, arrow indicates hook-like cymbial apophysis; D, palpal tibia, dorsal, arrows indicate trichobothria; E, metatarsus I; F, tarsus, arrow indicates tarsal organ. CB: cymbium; E: embolus; T: tegulum.

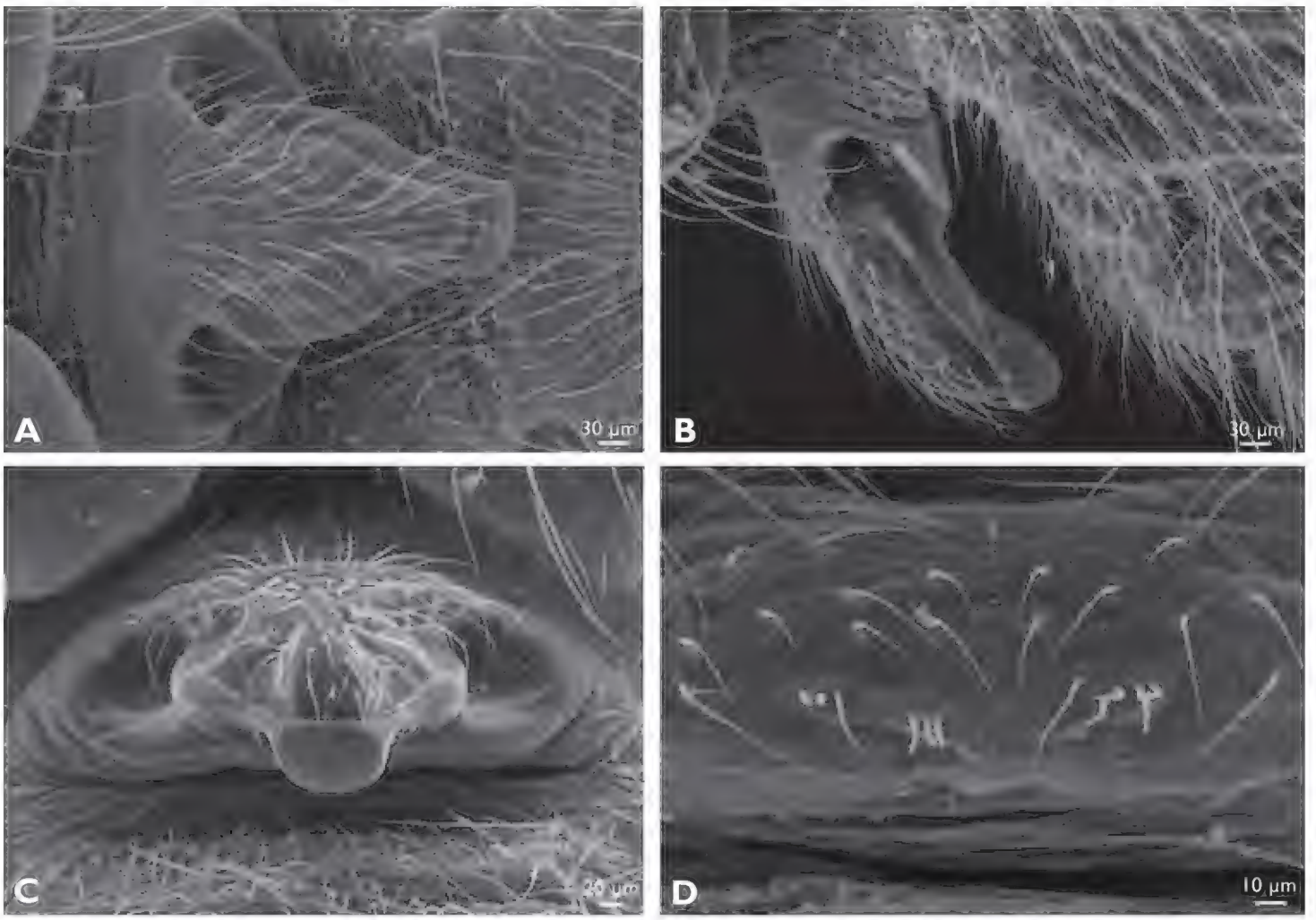


Figure 56. *Maymena paquini* sp. n. from Wayala Ku cave, SEM. A, epigynum, ventral; B, epigynum, lateral; C, epigynum, posterior; D, epiandrous gland spigots; E, female labrum, anterior, dorsal to the right; F, labrum, lateral, dorsal to the right.

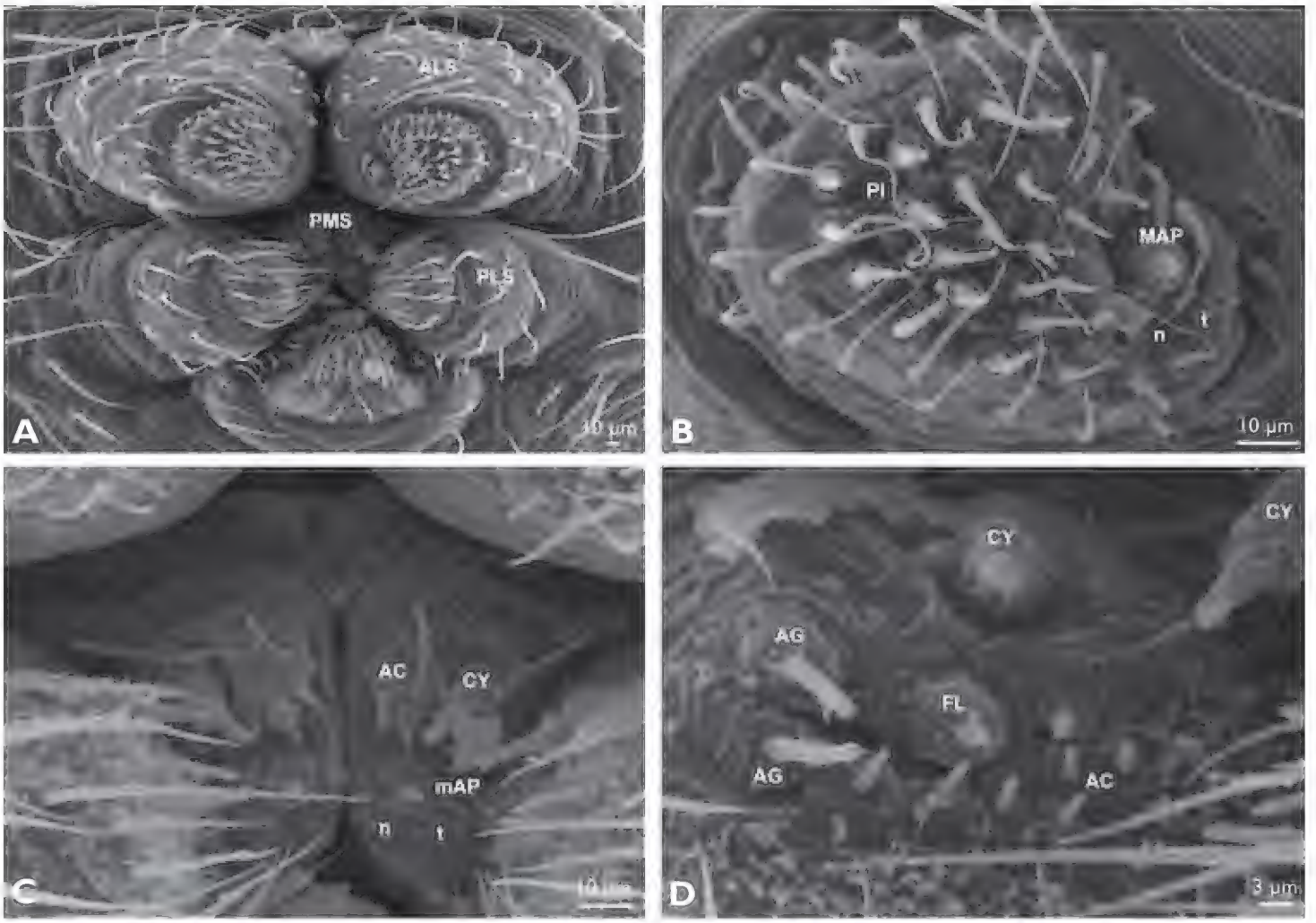


Figure 57. *Maymena paquini* sp. n. from Wayala Ku cave, SEM of spinnerets. A-D, female; E, F, male. A, spinnerets; B, PLS; C, E, PMS; D, F, PLS, arrow indicates modified PLS seta. AC: aciniform gland spigot; AG: aggregate gland spigot; AGn: aggregate gland spigot nubbin; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; FLn: flagelliform gland spigot nubbin; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

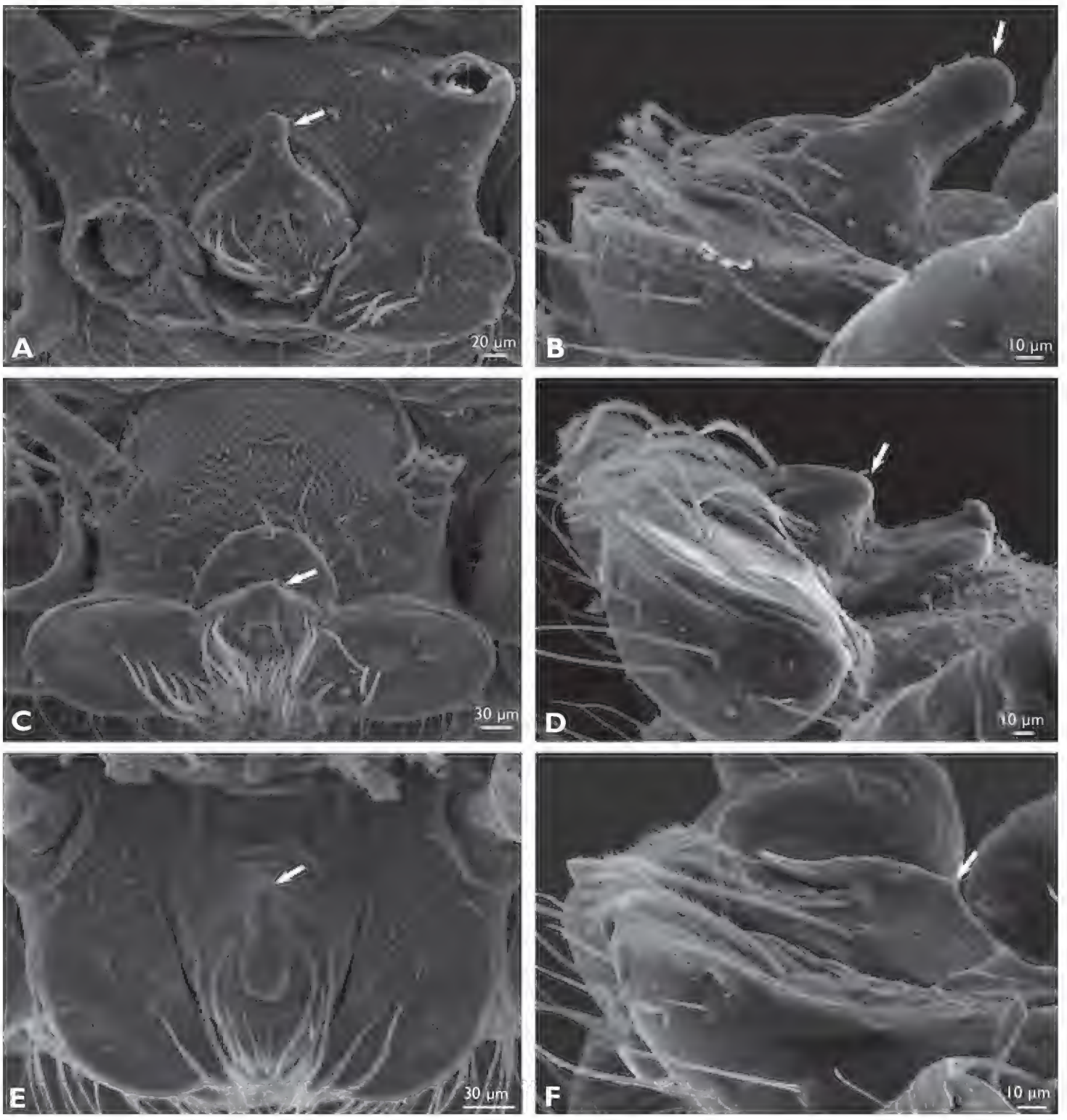


Figure 58. Labra of Anapidae. A, B, *Anapisona kethleyi* Platnick and Shadab 1979 from Mexico, Veracruz, Lago Catemaco, 18°26'N, 95°6'W, 12 February 1984, V. & B. Roth; C, D, *Anapis* sp. from Bolivia, Dpto. Beni, 16.8 mi SW Yucumo, 15°23'S, 66°59'W, 15-19 November 1989, Coddington, Griswold, Silva, Larcher and Peñaranda; E, F, *Gertschanapis shantzi* (Gertsch 1960) from USA, California, Sonoma Co., 0.7 mi NE Fort Ross, 21 June 1996, redwood forest, C.E. Griswold and R. Carlson. A, C, E, anterior view; B, D, F, lateral view, dorsal to the right. Arrows indicate maximum extension of the base of the labrum.

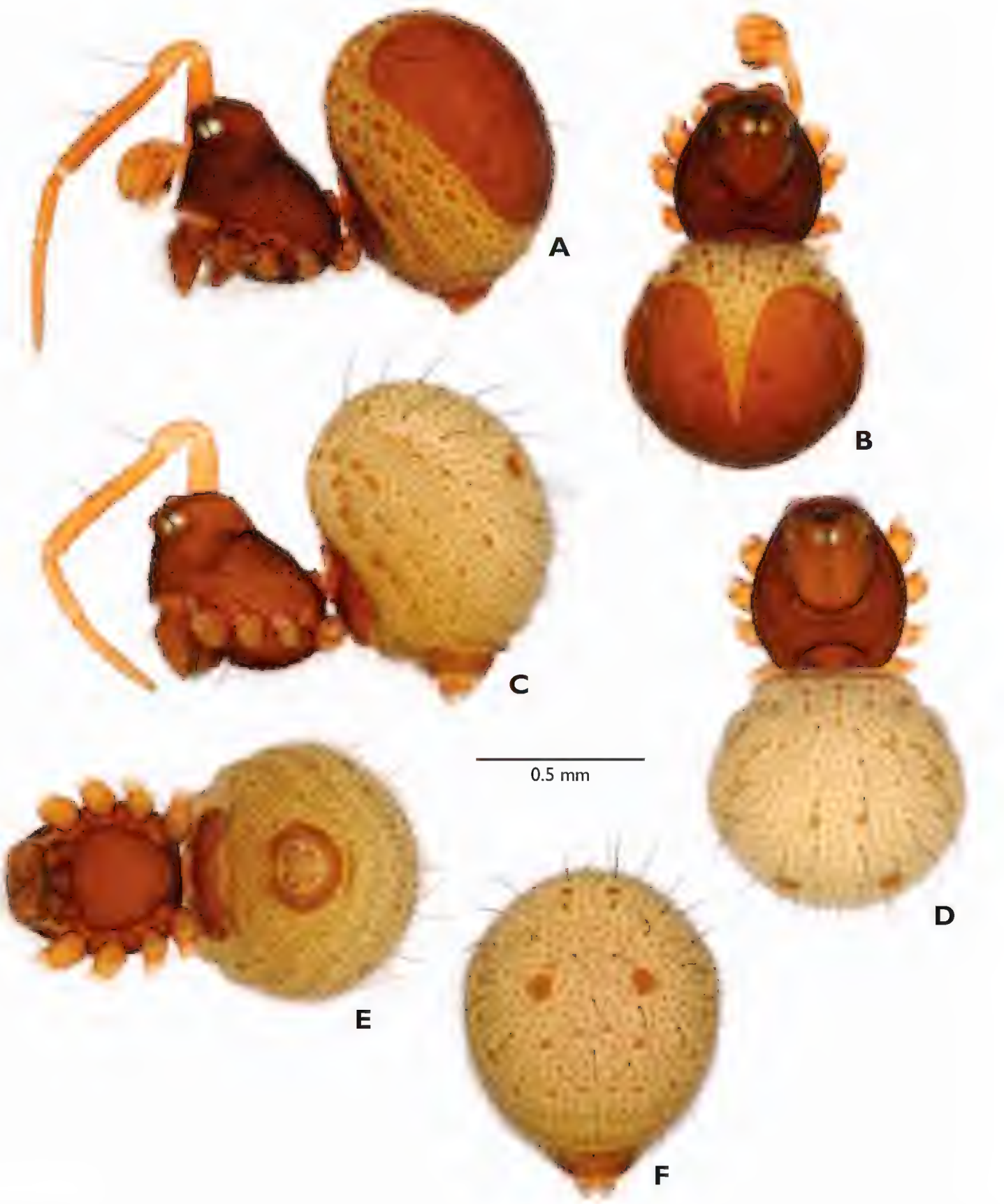


Figure 59. *Gaiziapis zhizhuba* sp. n. from Nankang Yakou. A, male, lateral; B, male, dorsal; C, female, lateral; D, female, dorsal; E, female, ventral; F, female, posterior.

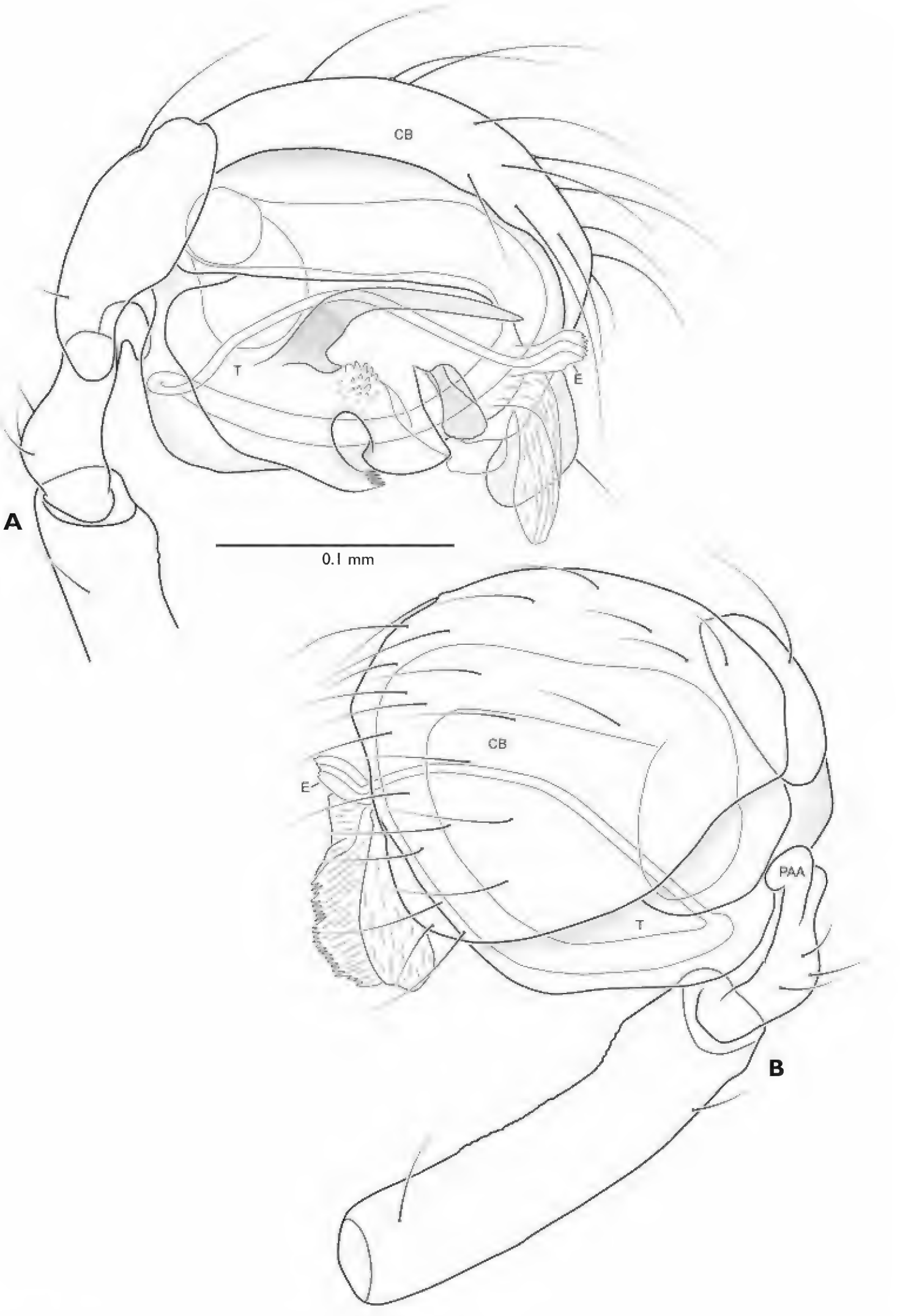


Figure 60. *Gaiziapis zhizhuba* sp. n. from Nankang Yakou, male palp. A, prolateral; B, retrolateral. CB: cymbium; E: embolus; PAA: patella apophysis; T: tegulum.

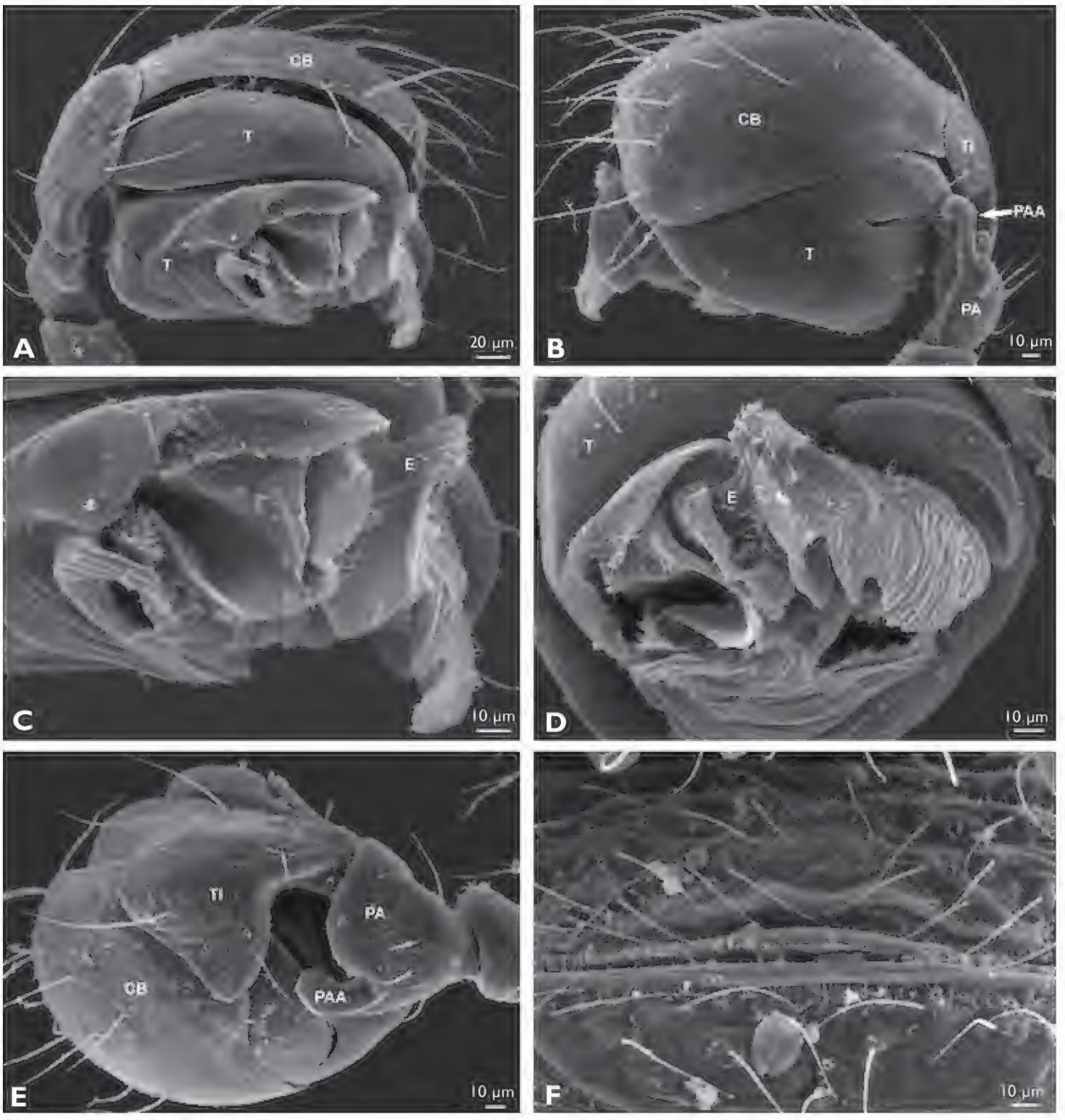


Figure 61. *Gaiziapis zhizhuba* sp. n. from Nankang Yakou, SEM. A, palp, prolateral; B, palp, retrolateral; C, palp, prolateral detail; D, palp, apical; E, palp, dorsal; F, epigynum. CB: cymbium; E: embolus; PA: patella; PAA: patella apophysis; T: tegulum; TI, tibia.

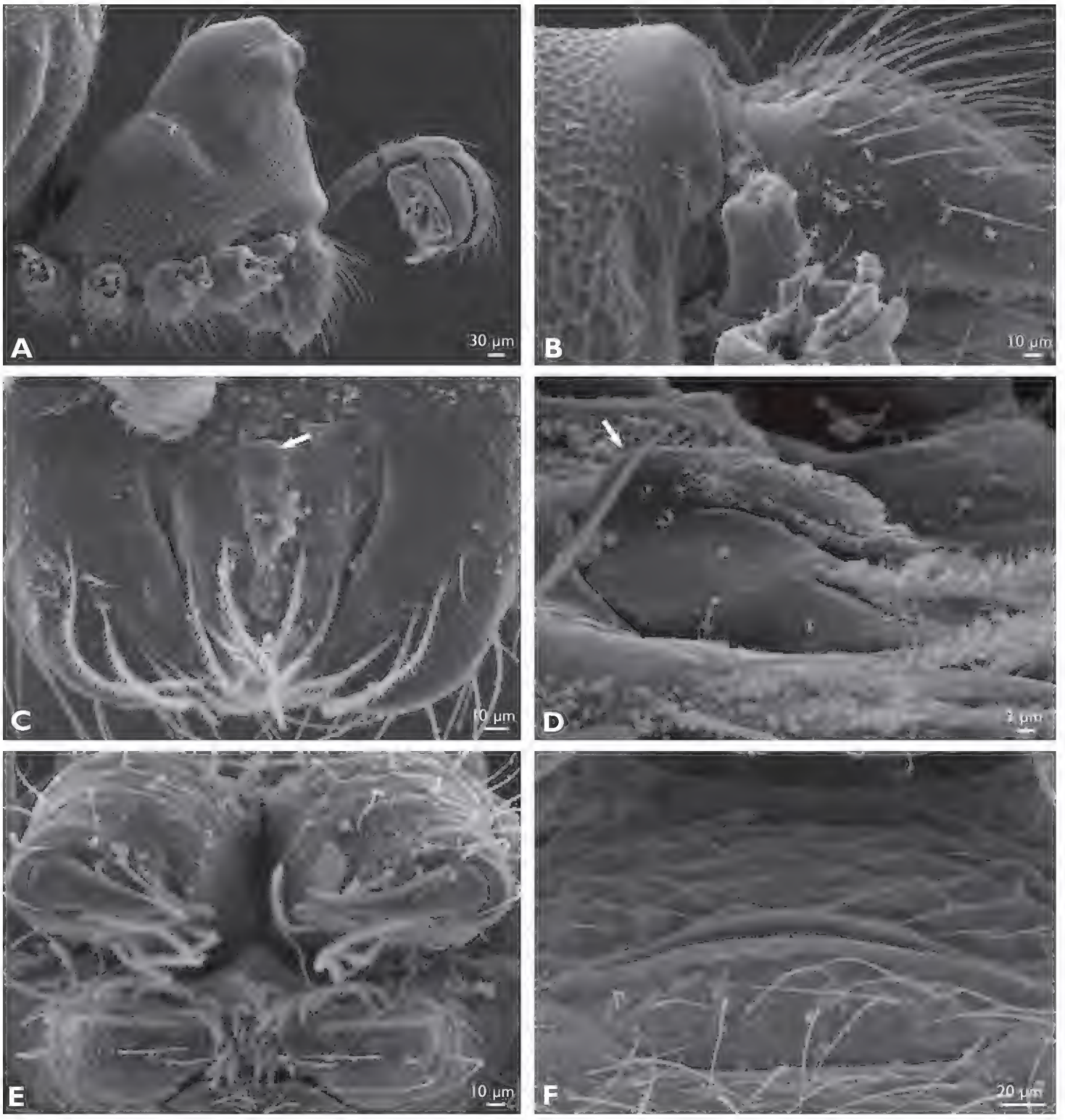


Figure 62. *Gaiziapis zhizhuba* sp. n. from Nankang Yakou, SEM of male. A, prosoma, lateral; B, prosoma, anterolateral margin; C, labrum, anterior view; D, labrum, lateral view, dorsal to the left; E, chelicera, labrum, endites, ventral view; F, epiandrous region. Arrows in C and D indicate maximum extension of labrum.

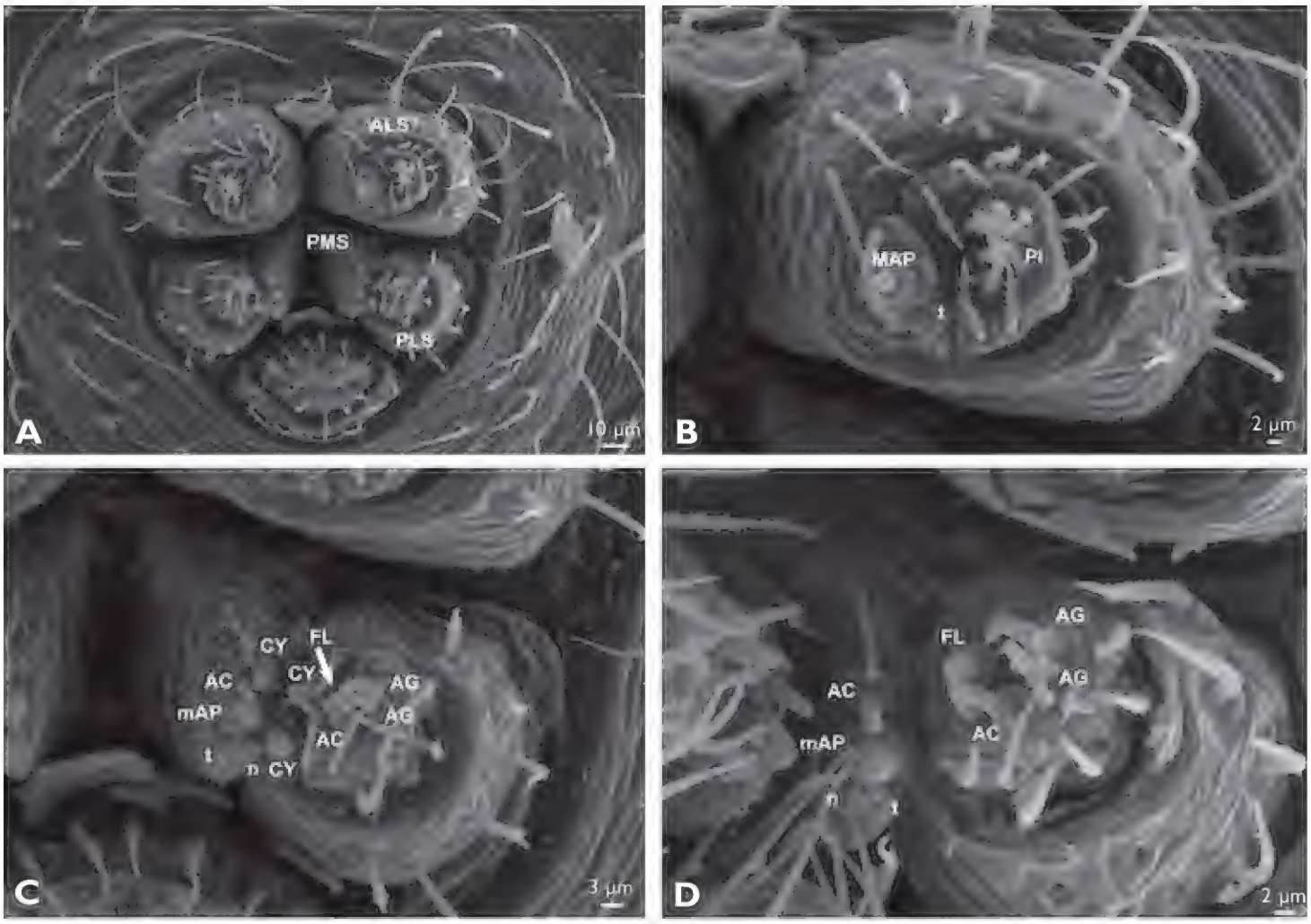


Figure 63. *Gaiziapis zhizhuba* sp. n. from Nankang Yakou, SEM. A, female spinnerets; B, female ALS; C, female PLS; D, male PLS; E, epiandrous region, booklung covers, and pedicel insertion; F, epigynum, booklung covers, and pedicel insertion. AC: aciniform gland spigot; AG: aggregate gland spigot; ALS: anterior lateral spinneret; BC: booklung cover; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

Figure 64. Webs of *Gaiziapis zhizhuba* sp. n. from Nankang Yakou. A, B, web of male; C, web of female.

Figure 65. A-E, *Patu jidanweishi* sp. n. from Chang Yan He; F-H, *Patu qiqi* from QiQi He. A, male, lateral; B, F, female, lateral; C, G, female, dorsal; D, H, female, ventral; E, male leg II, prolateral.

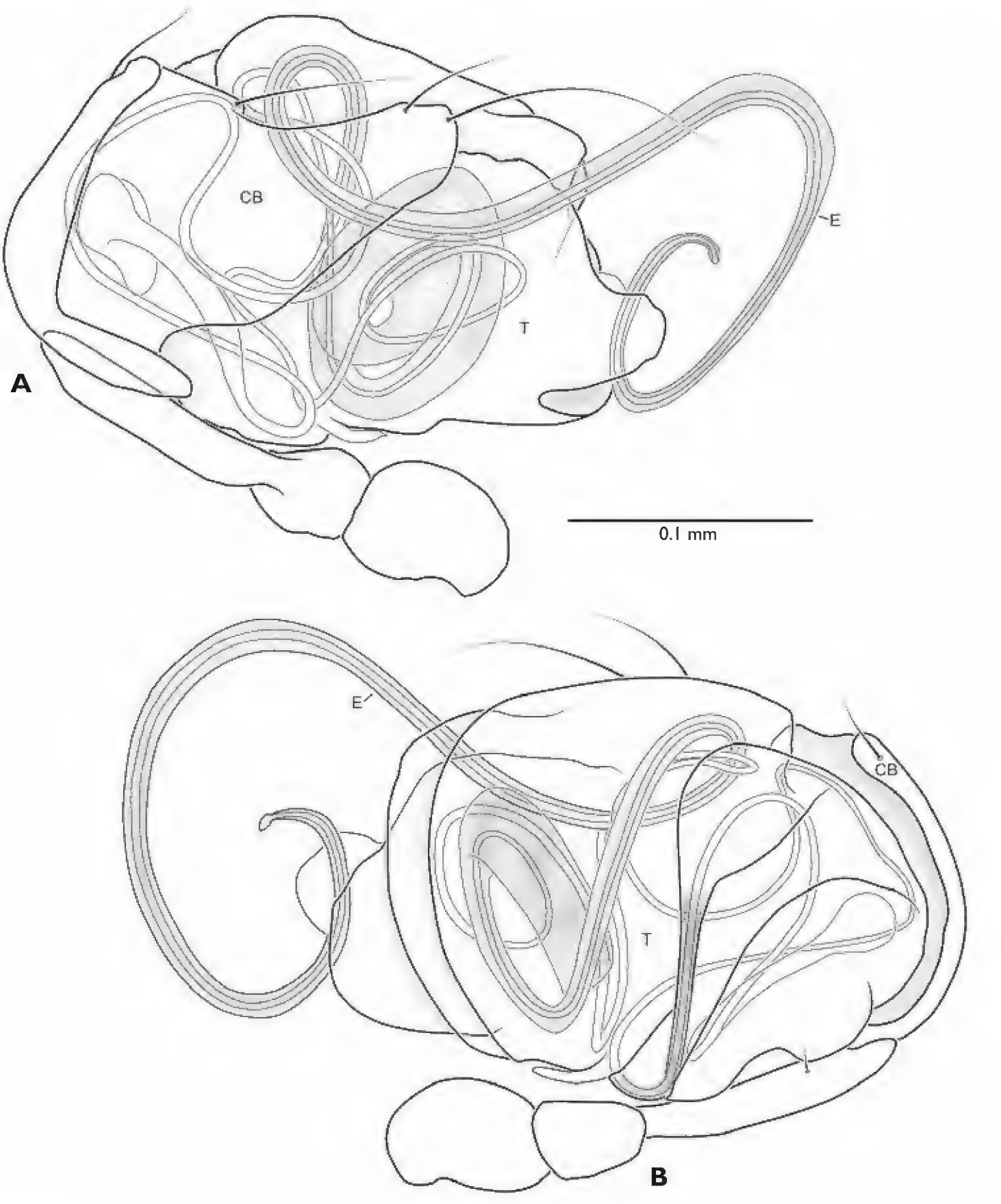


Figure 66. *Patu jidanweishi* sp. n. from Chang Yan He, male palp. A, prolateral; B, retrolateral. CB: cymbium; E: embolus; T: tegulum.

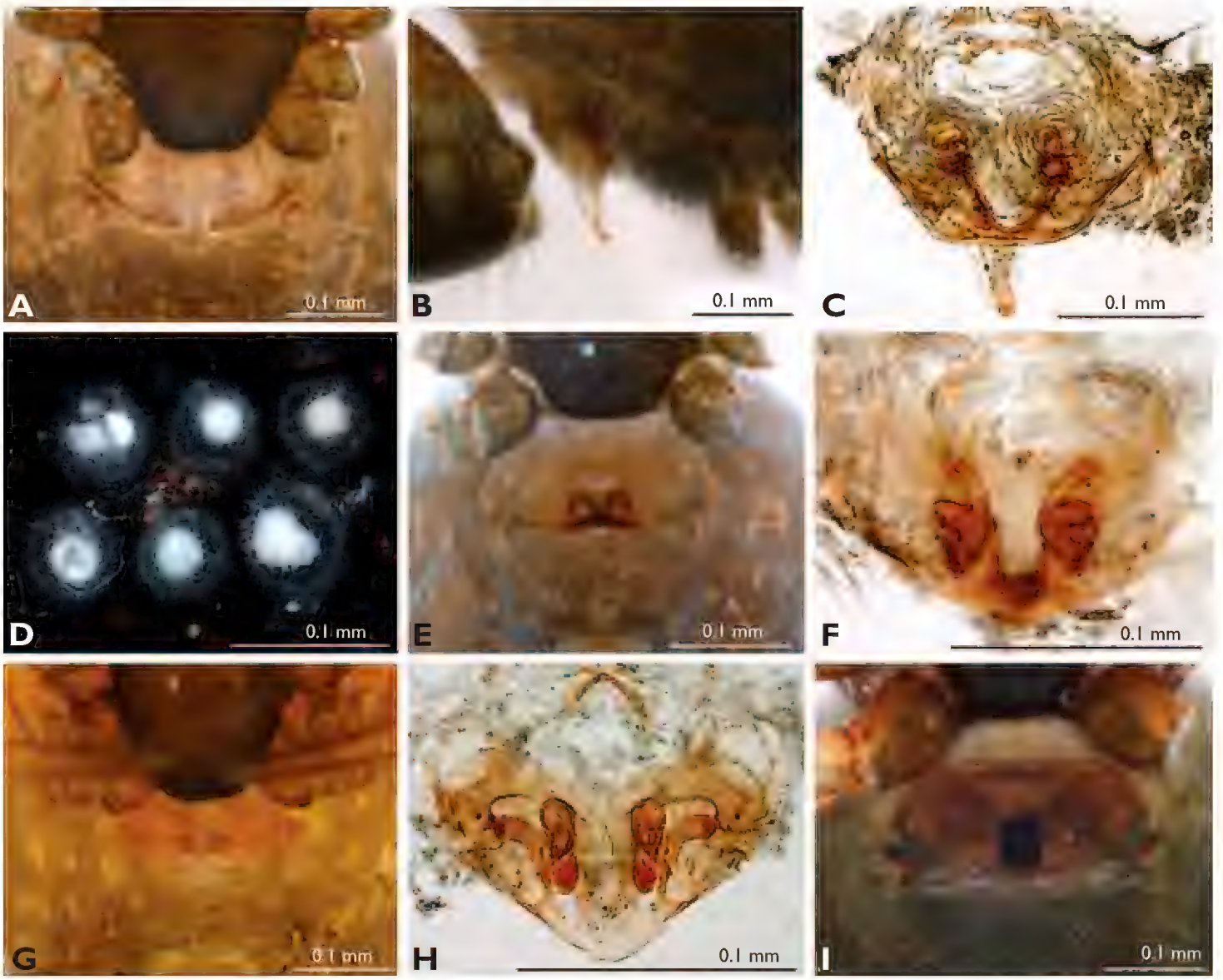
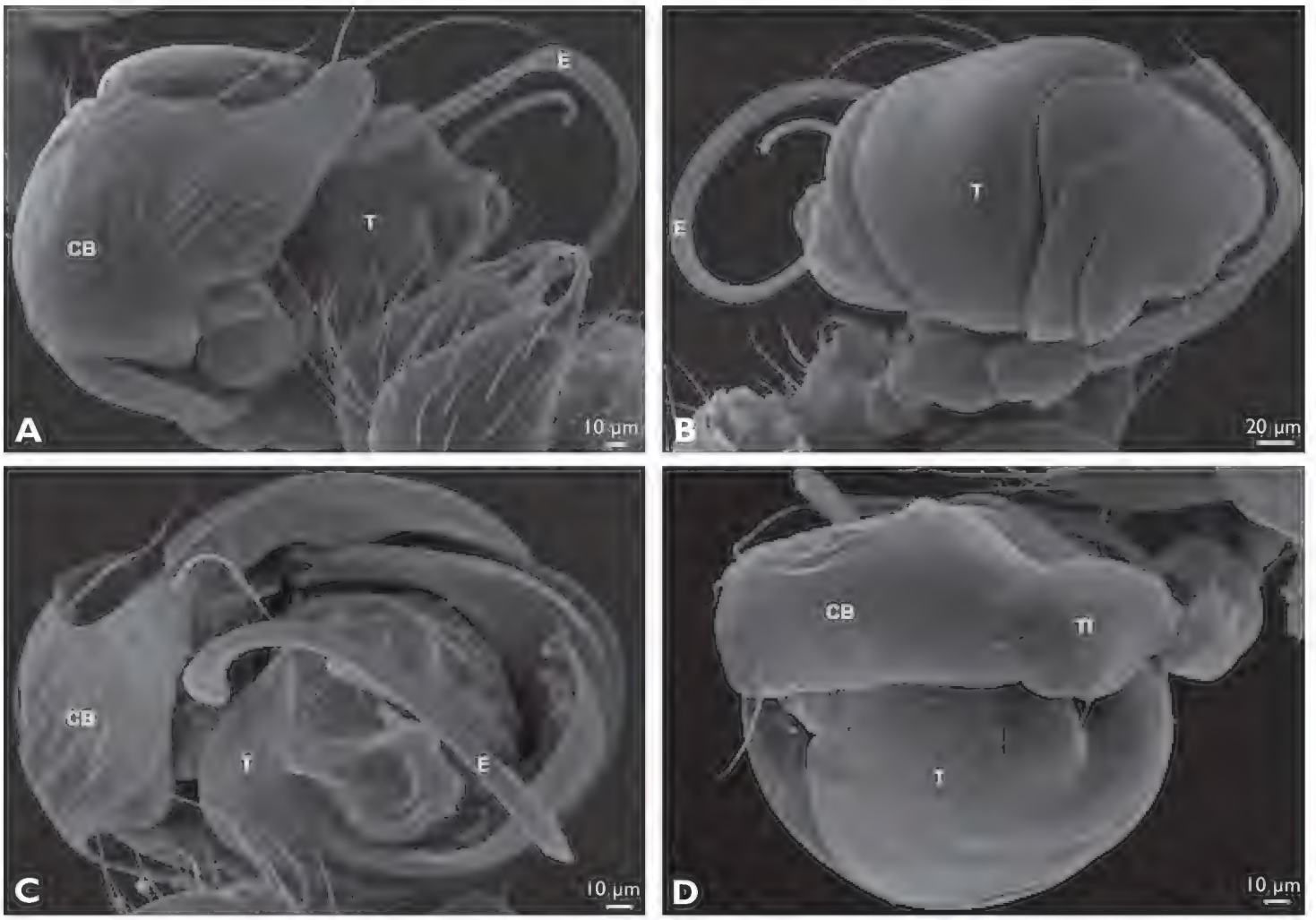


Figure 67. A-D, *Patu jidanweishi* sp. n. from Chang Yan He; E, F, *Patu qiqi* from QiQi He; G, H; *Patu xiaoxiao* sp. n. from Chang Yan He; I, *Crassignatha pianma* sp. n. from Chang Yan He. A, E, G, I, epigynum, ventral view; B, epigynum, lateral view; C, F, H, cleared vulva, dorsal view; D, eggs.



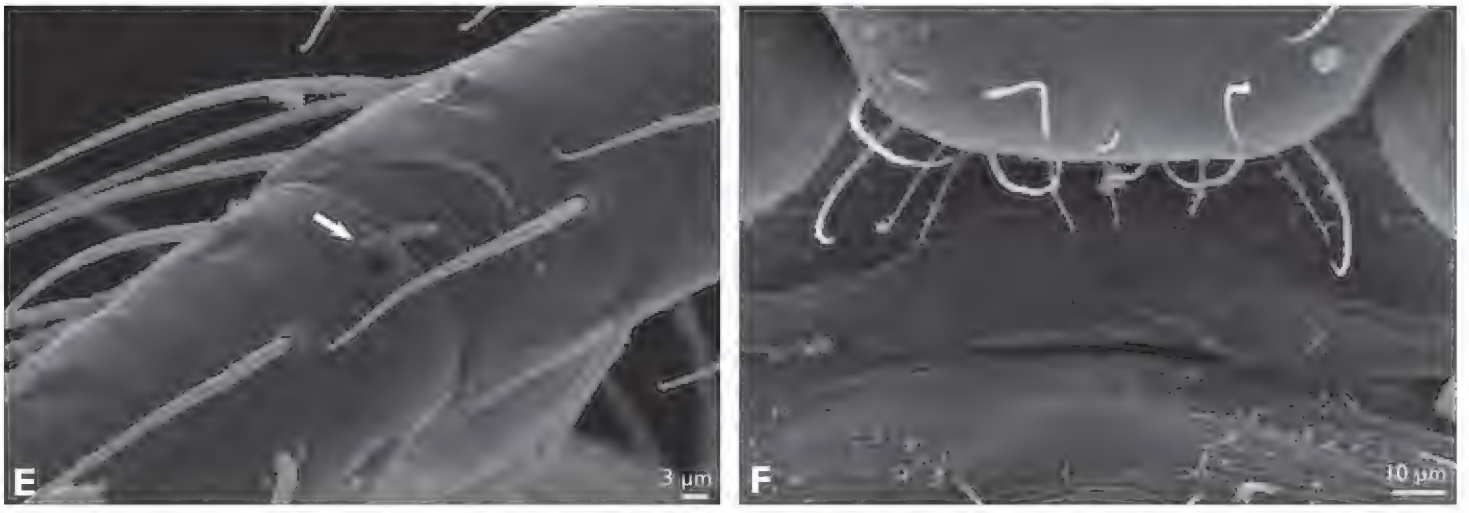


Figure 68. *Patu jidanweishi* sp. n. from Chang Yan He, SEM of male. A, palp, prolateral; B, palp, retrolateral; C, palp, apical; D, palp, dorsal; E, metatarsus-tarsus joint, arrow indicates tarsal organ; F, epiandrous region. CB: cymbium; E: embolus; T: tegulum; TI, tibia.

Figure 69. *Patu jidanweishi* sp. n. from Chang Yan He, SEM. A-E, male; F, female. A, prosoma, lateral; B, prosoma, anterior, dorsal to left; C, prosoma, lateral, detail showing sulci and lateral eyes; D, detail of sulci, arrows indicate pores; E, fang and distal part of chelicera showing single tooth; F, chelicera removed from prosoma.

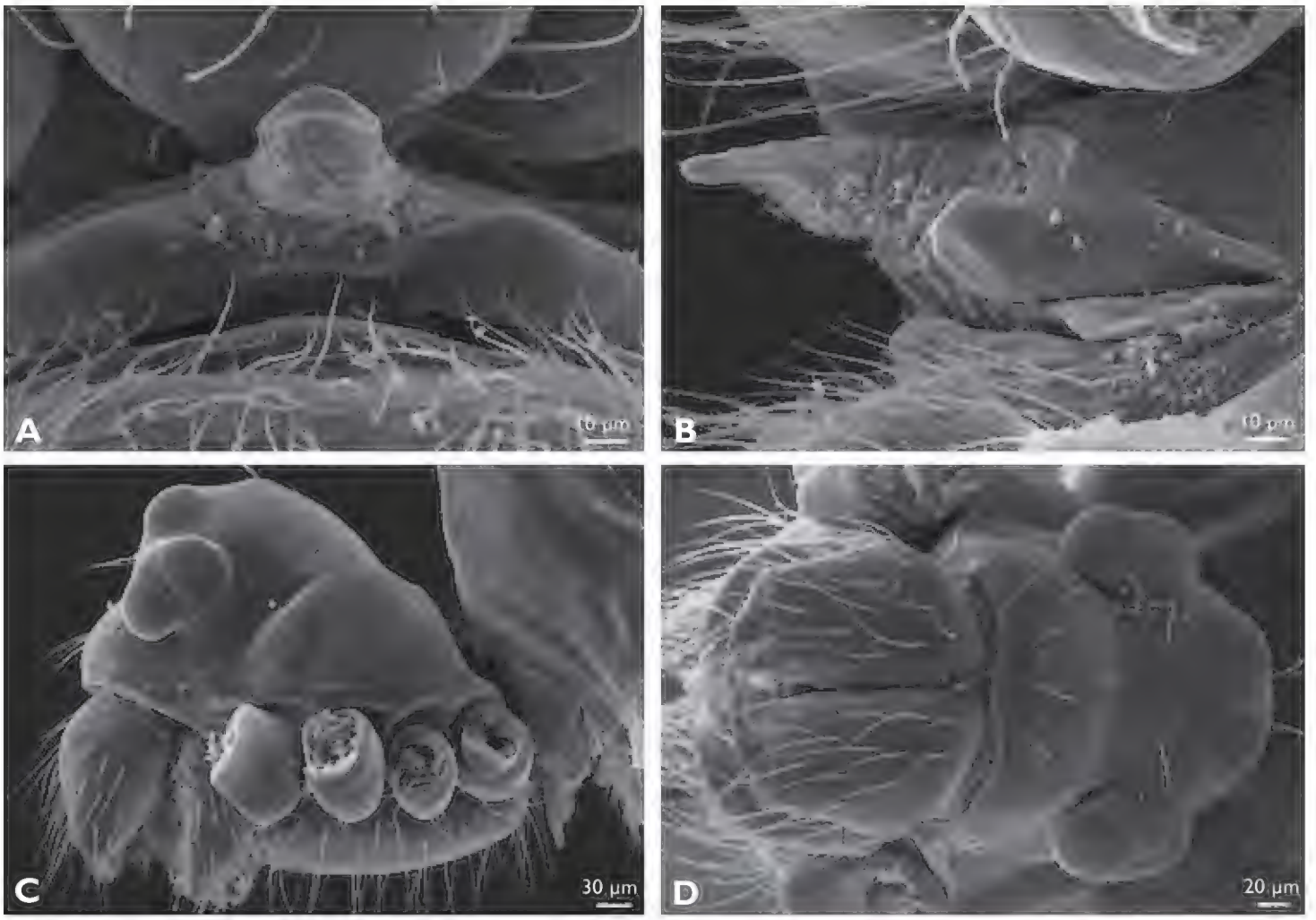


Figure 70. *Patu jidanweishi* sp. n. from Chang Yan He, SEM of female. A, epigynum, posterior; B, epigynum, lateral, dorsal to the right; C, prosoma, lateral; D, prosoma, anterior, dorsal to the right; E, labrum, anterior; F, labrum, lateral, dorsal to the right. Arrows in E and F indicate maximum extension of labrum.

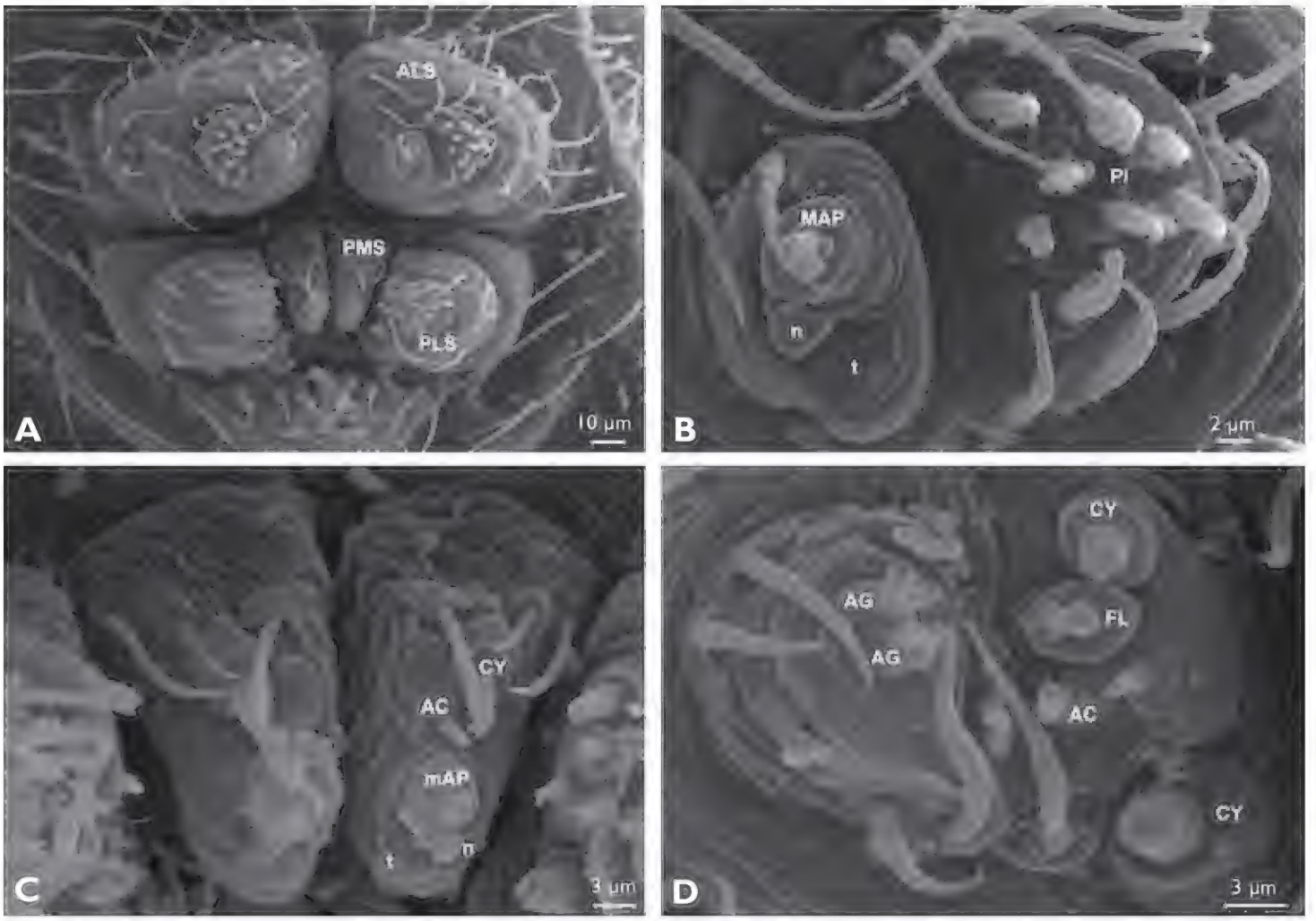


Figure 71. *Patu jidanweishi* sp. n. from Chang Yan He, SEM of spinnerets. A-D, female; E, F, male. A, spinnerets; B, ALS; C, E, PMS; D, F, PLS. AC: aciniform gland spigot; AG: aggregate gland spigot; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

Figure 72. Webs of symphytognathid spiders. A, *Patu jidanweishi* sp. n., female from Xiao Hei Shan Nature Reserve; B, *Patu jidanweishi* sp. n., male from Pianma; C, D, *Crassignatha pianma* sp. n., female from Chang Yan He; E, *Crassignatha yinzhi* sp. n., female from Xiao Hei Shan Nature Reserve.

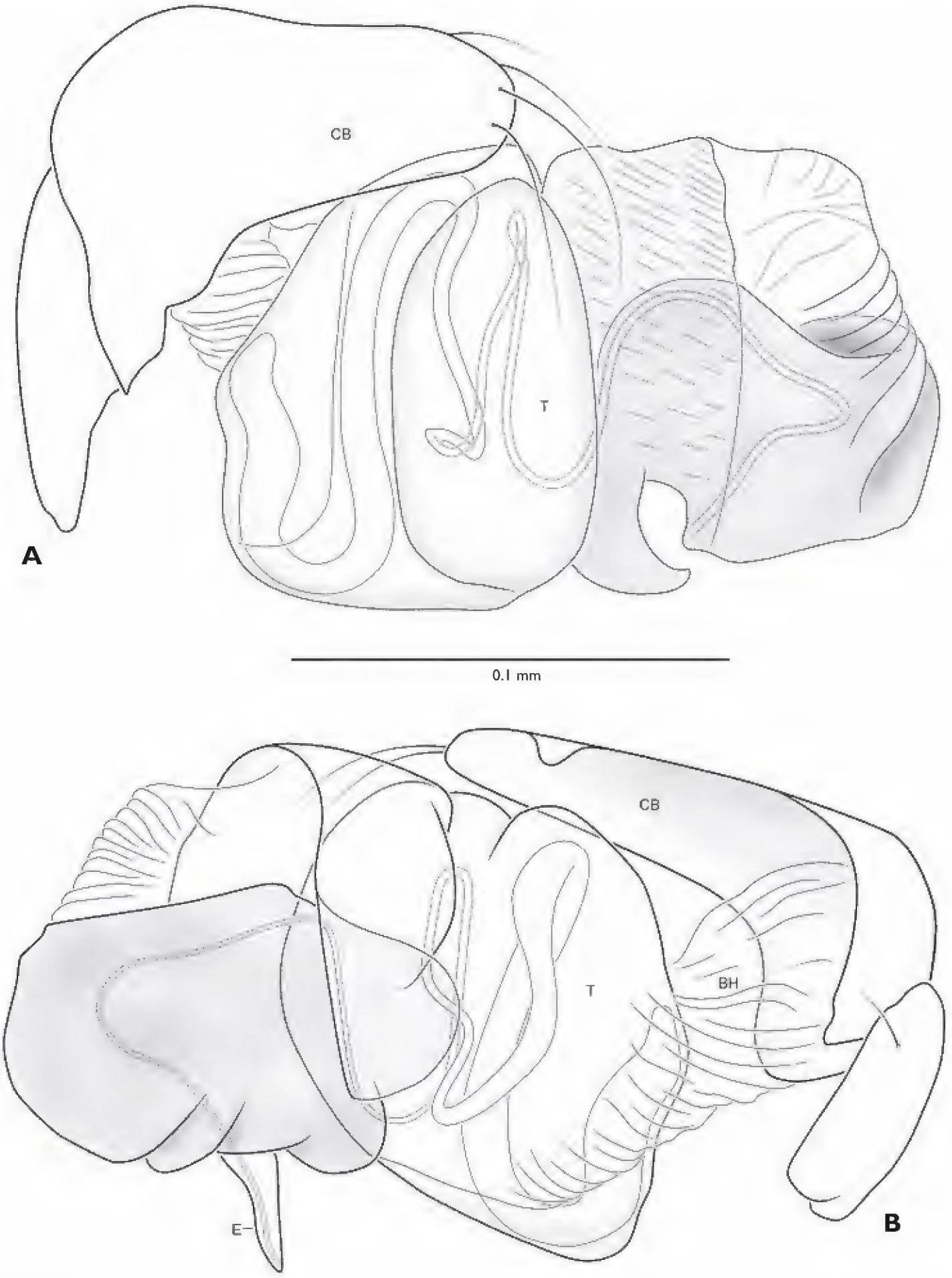


Figure 73. *Patu qiqi* sp. n. from QiQi He, slightly expanded male palp. A, prolateral; B, retrolateral. BH: basal hematodocha; CB: cymbium; E: embolus; T: tegulum.

Figure 74. *Crassignatha pianma* sp. n. from Chang Yan He. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, male leg II, prolateral.

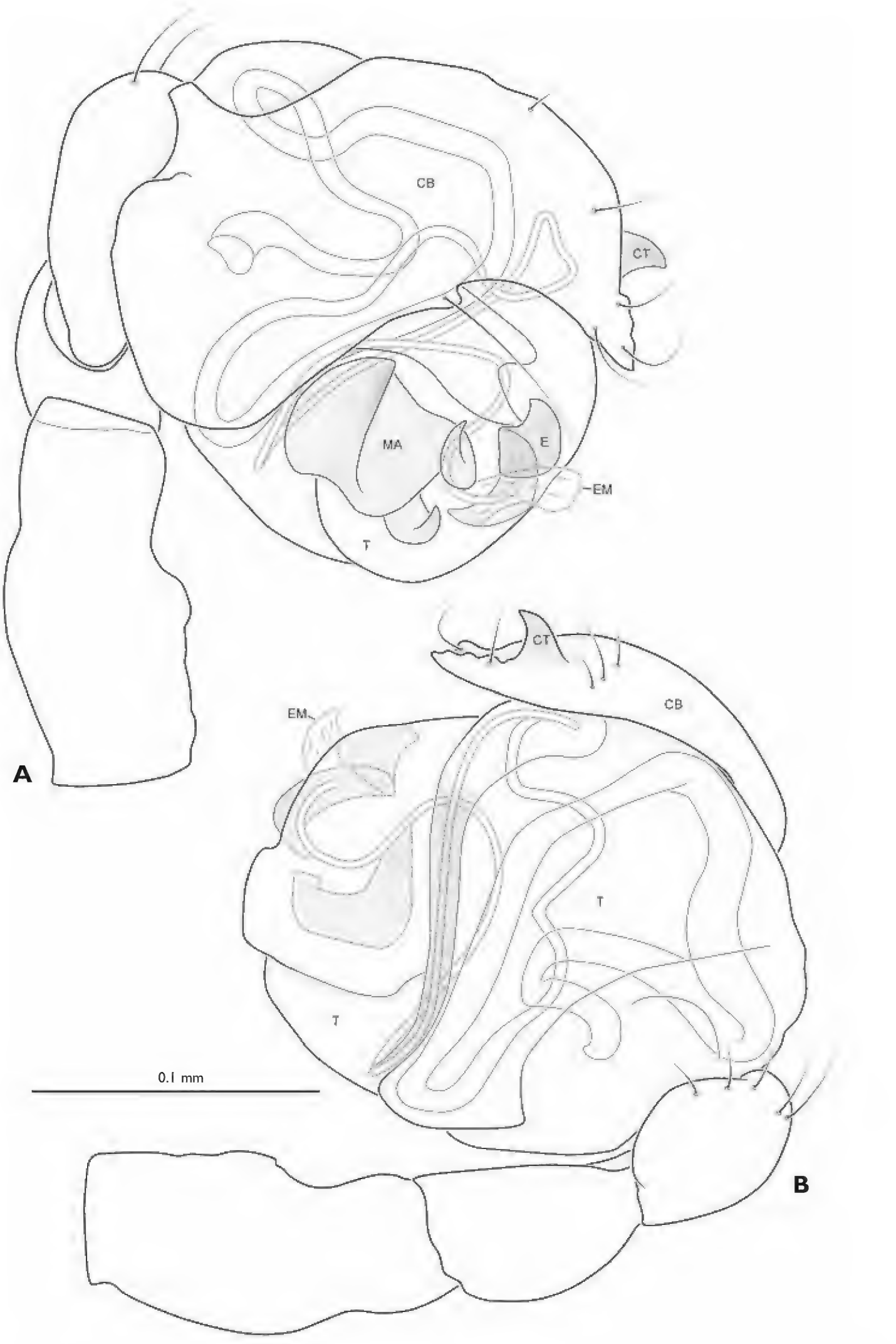


Figure 75. *Crassignatha pianma* sp. n. from Chang Yan He, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum.

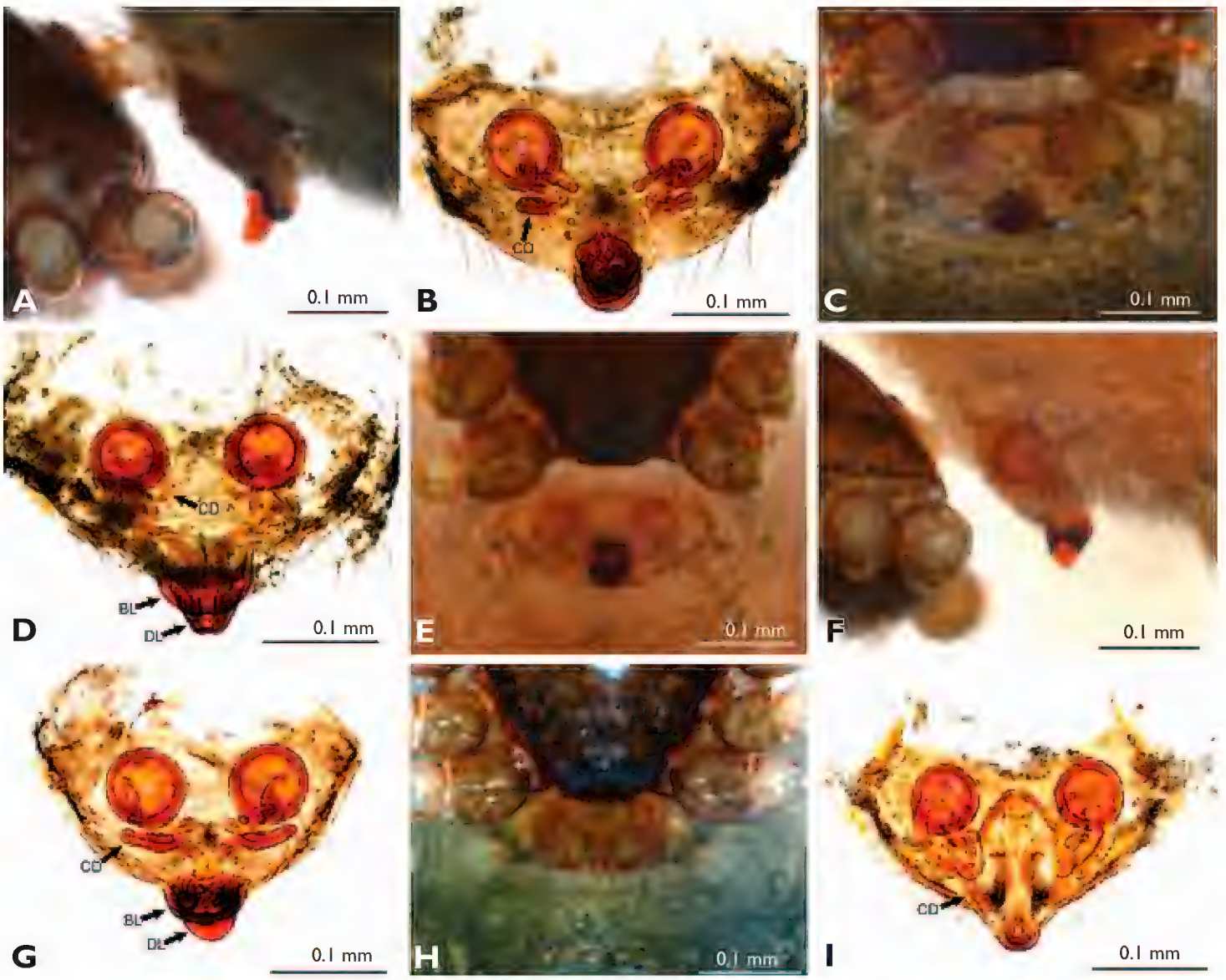


Figure 76. A, B, *Crassignatha pianma* sp. n. from Chang Yan He; C, D, *Crassignatha yinzhi* from Xiao Hei Shan Nature Reserve; E-G, *Crassignatha quanqu* sp. n. from Bang Bie village; H, I, *Crassignatha yamu* sp. n. from Yamu He. A, F, epigynum, lateral view; B, D, G, I, cleared vulva, dorsal view; C, E, H, epigynum, ventral view. CD: copulatory duct; S: spermatheca.

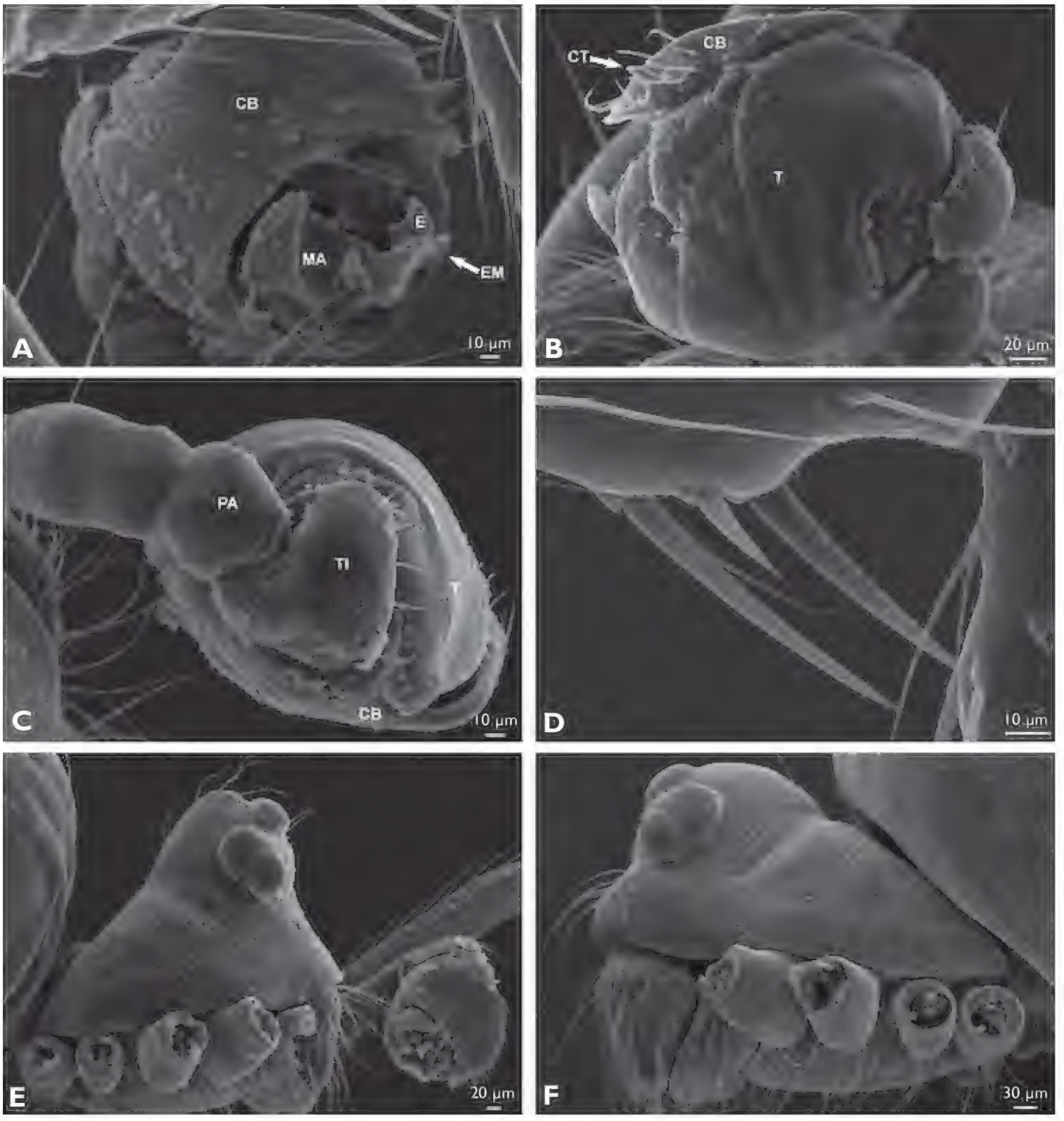


Figure 77. *Crassignatha pianma* sp. n. from Chang Yan He, SEM. A-E, male; F, female. A, palp, prolateral; B, palp, retrolateral; C, palp, dorsal; D, distal ventral part of tibia II showing presumed mating claspers; E, F, prosoma, lateral. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum; TI: tibia; PA: patella.

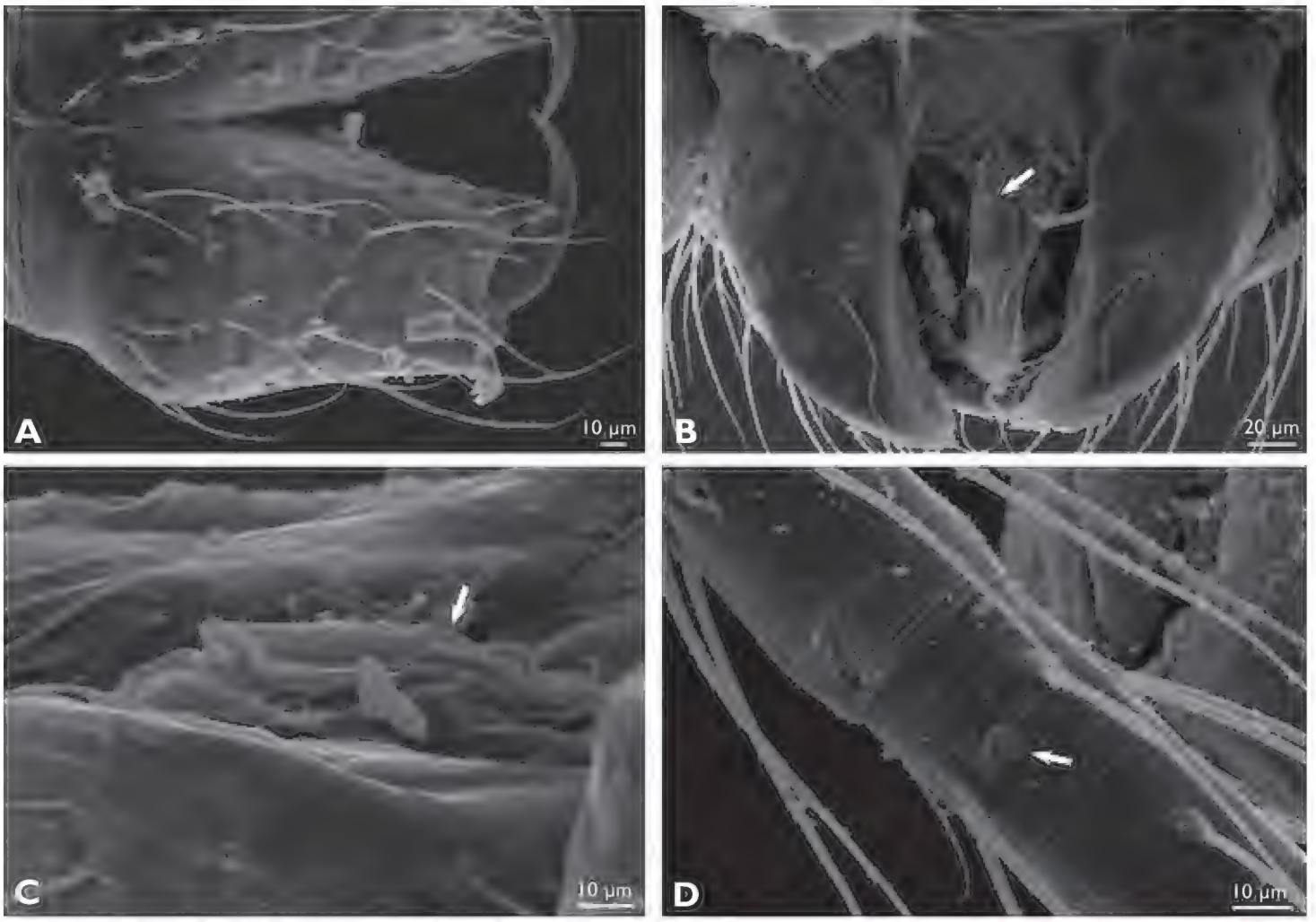


Figure 78. SEM. A-D, *Crassignatha pianma* sp. n. from Chang Yan He; E, *Crassignatha yinzhi* from Xiao Hei Shan Nature Reserve; F, *Crassignatha quanqu* sp. n. from Bang Bie village. A, female chelicera removed from prosoma, note single asymetrically bifid tooth; B, labrum, anterior, female; C, labrum, lateral, female; D, male metatarsus-tarsus joint, arrow indicates tarsal organ; E, epiandrous region; F, prosoma, lateral, male. Arrows in B and C indicate maximum extension of labrum.

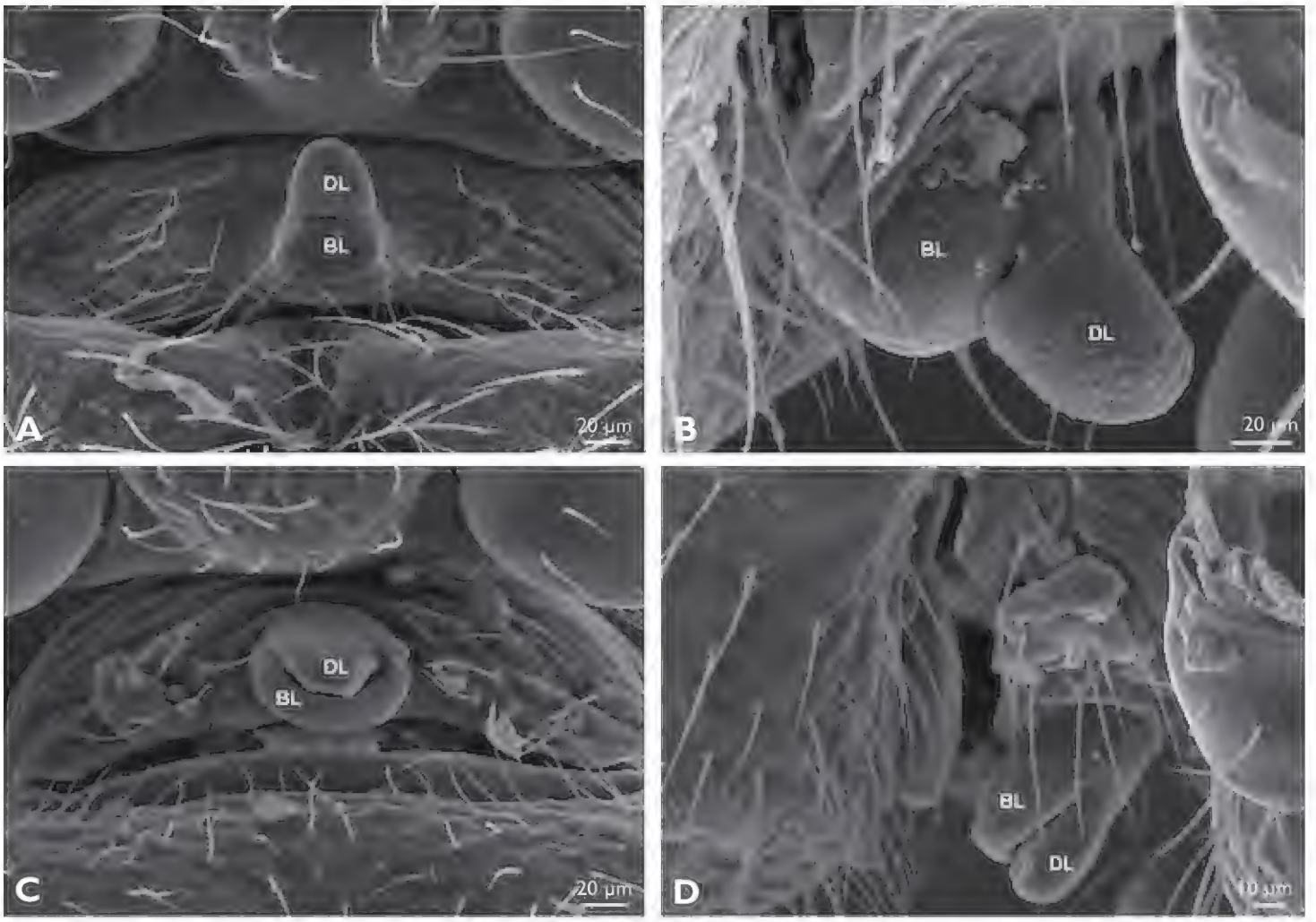


Figure 79. SEM, epigynum. A, B, *Crassignatha pianma* sp. n. from Chang Yan He; C, D, *Crassignatha yinzhi* from Xiao Hei Shan Nature Reserve; E, F, *Crassignatha quanqu* sp. n. from Bang Bie village. A, C, E, ventral; B, D, F, lateral, anterior to the right. BL: basal lobe of scape; DL: distal lobe of scape.

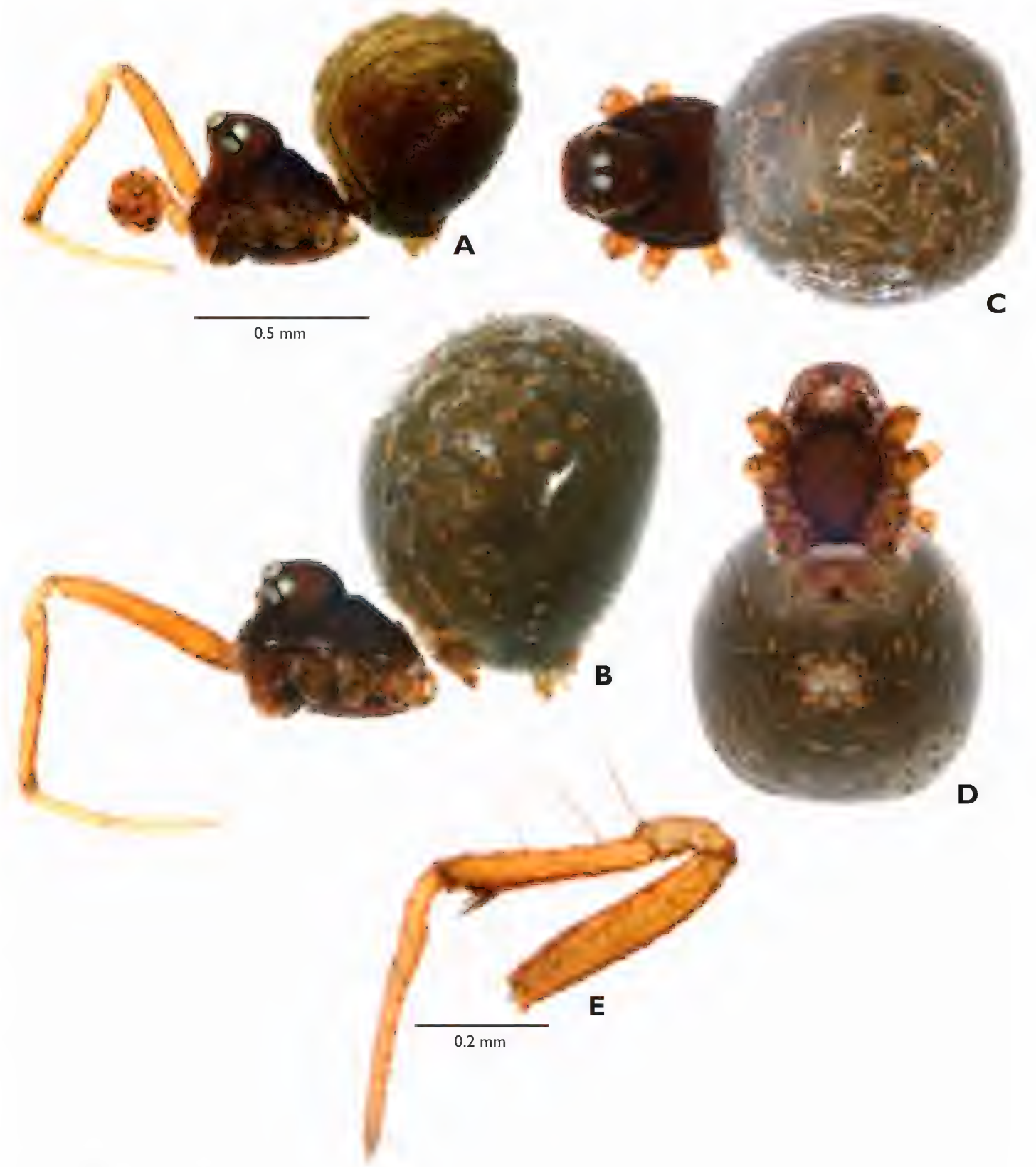


Figure 80. *Crassignatha yinzhi* from Xiao Hei Shan Nature Reserve. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, male leg II, prolateral.

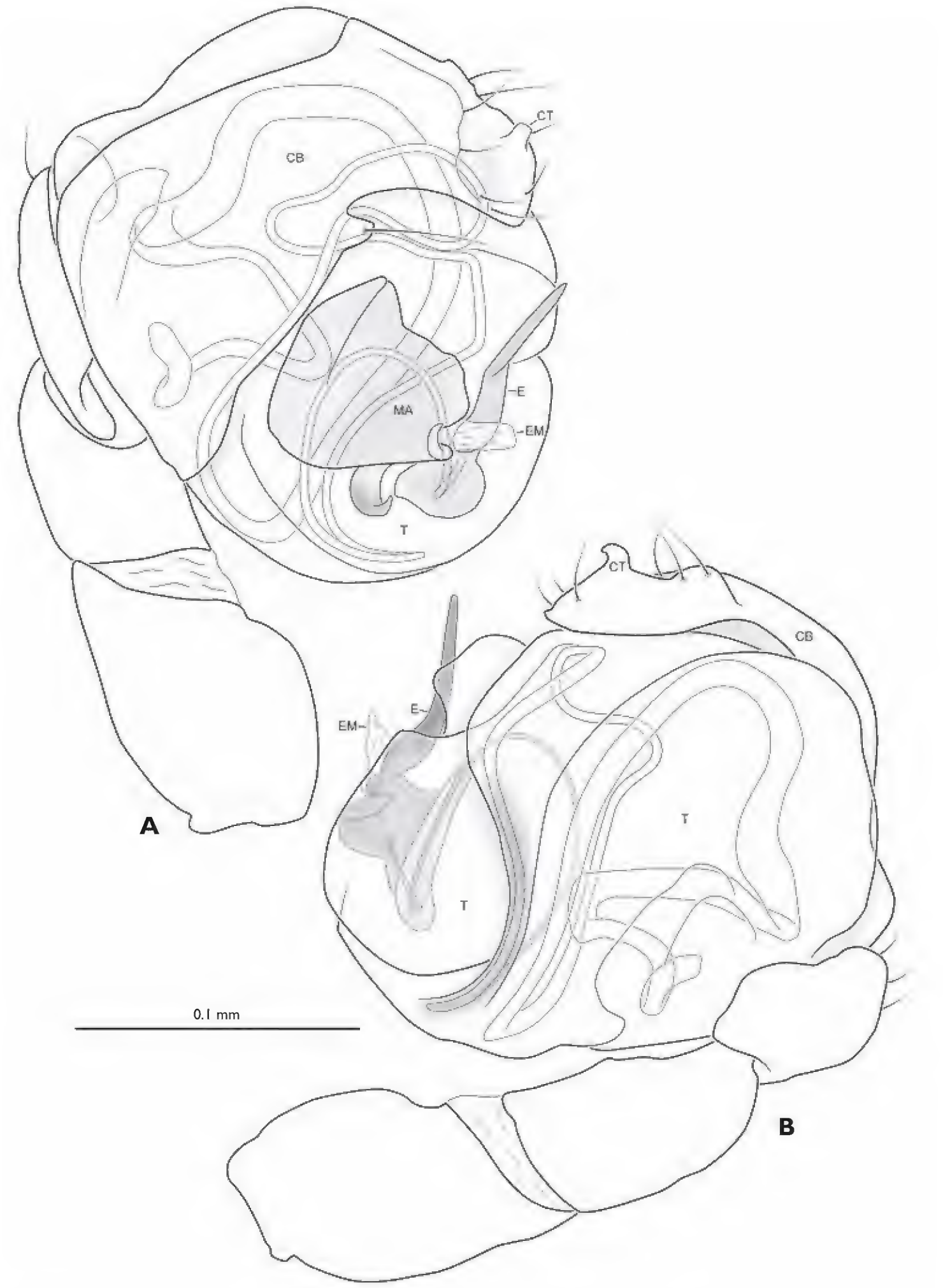


Figure 81. *Crassignatha yinzhi* from Xiao Hei Shan Nature Reserve, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum.

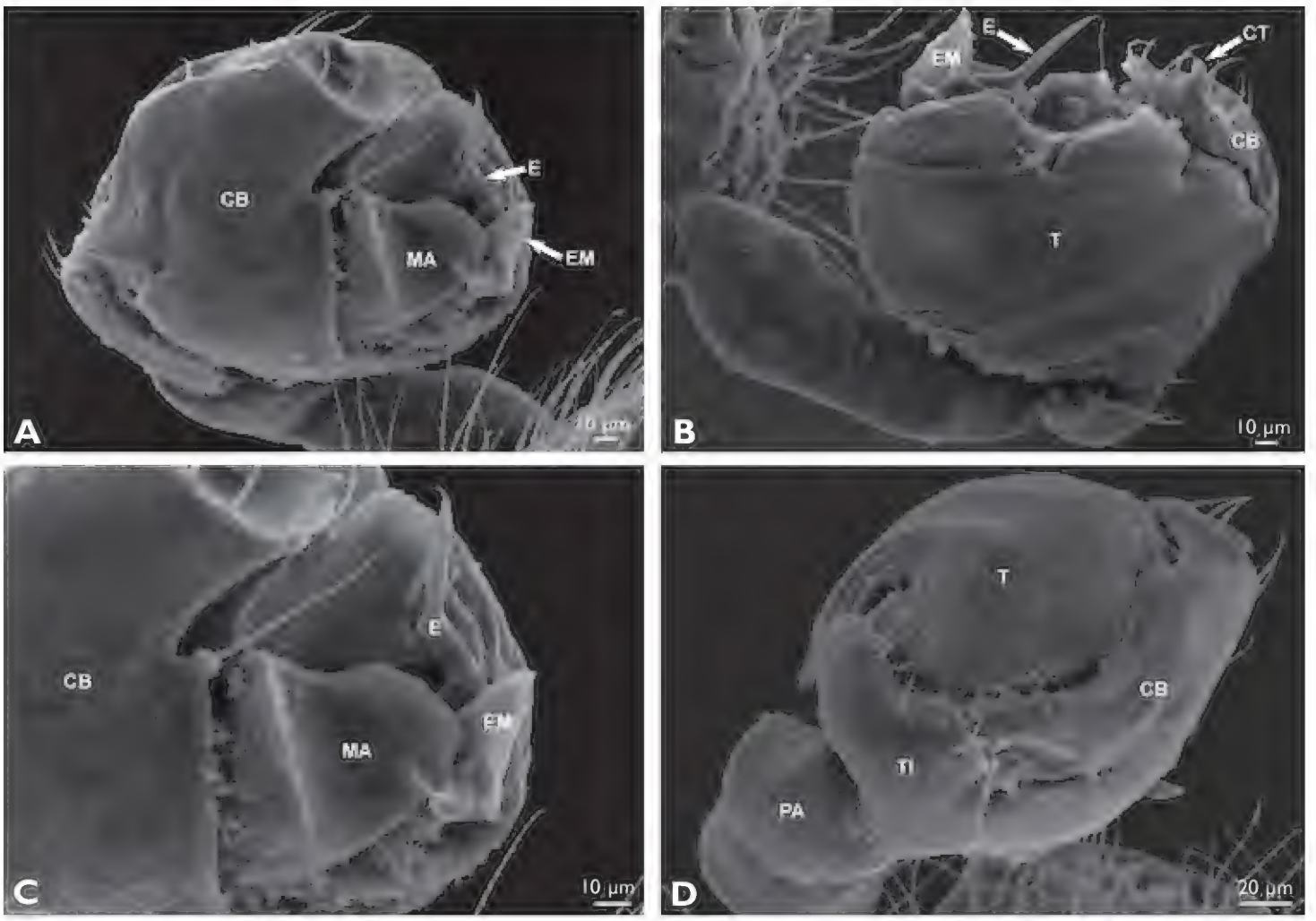


Figure 82. *Crassignatha yinzhi* from Xiao Hei Shan Nature Reserve, SEM of male. A, palp, prolateral; B, palp, retrolateral; C, palp, prolateral, detail; D, palp, dorsal; E, prosoma, lateral; F, prosoma, anterior, dorsal to the left. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum; TI: tibia; PA: patella.

Figure 83. *Crassignatha quanqu* sp. n. from Bang Bie village. A, male, lateral; B, female, lateral; C, female, dorsal; D, female, ventral; E, male leg II, prolateral.

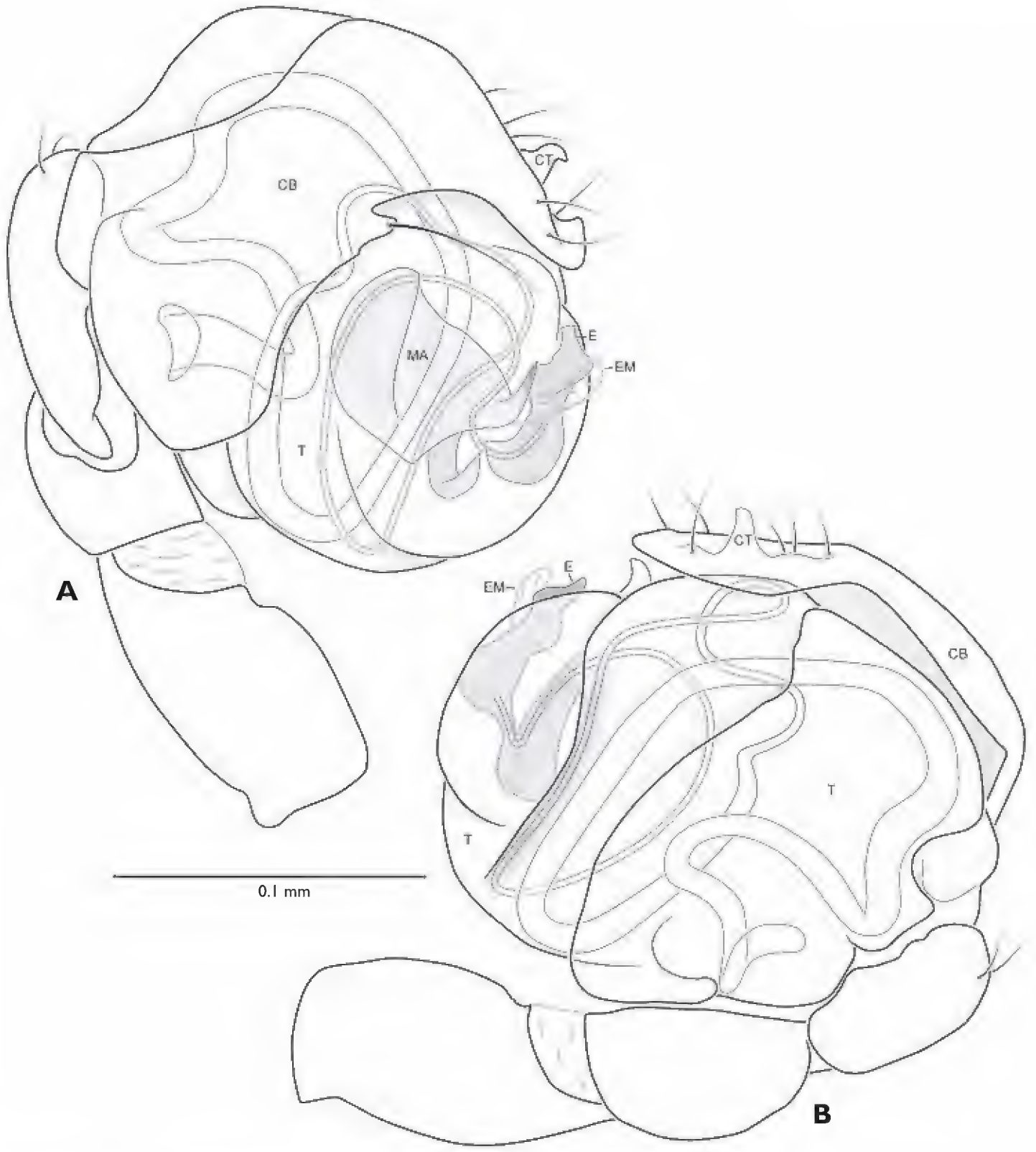


Figure 84. *Crassignatha quanqu* sp. n. from Bang Bie village, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum.

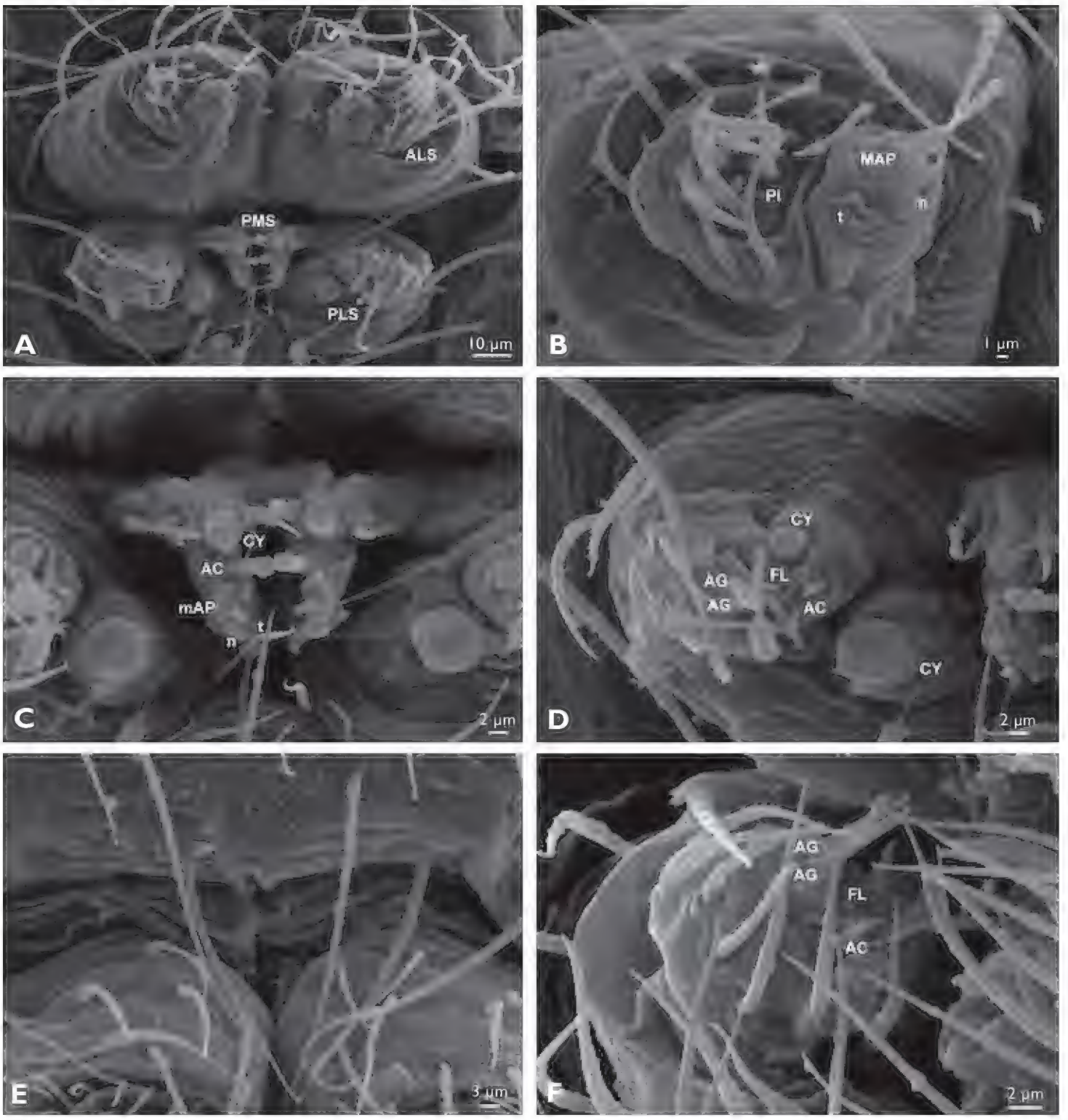


Figure 85. *Crassignatha quanqu* sp. n. from Bang Bie village, SEM of spinnerets. A-E, female; F, male. A, spinnerets; B, ALS; C, PMS; D, F, PLS; E, base of ALS showing lack of colulus. AC: aciniform gland spigot; AG: aggregate gland spigot; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

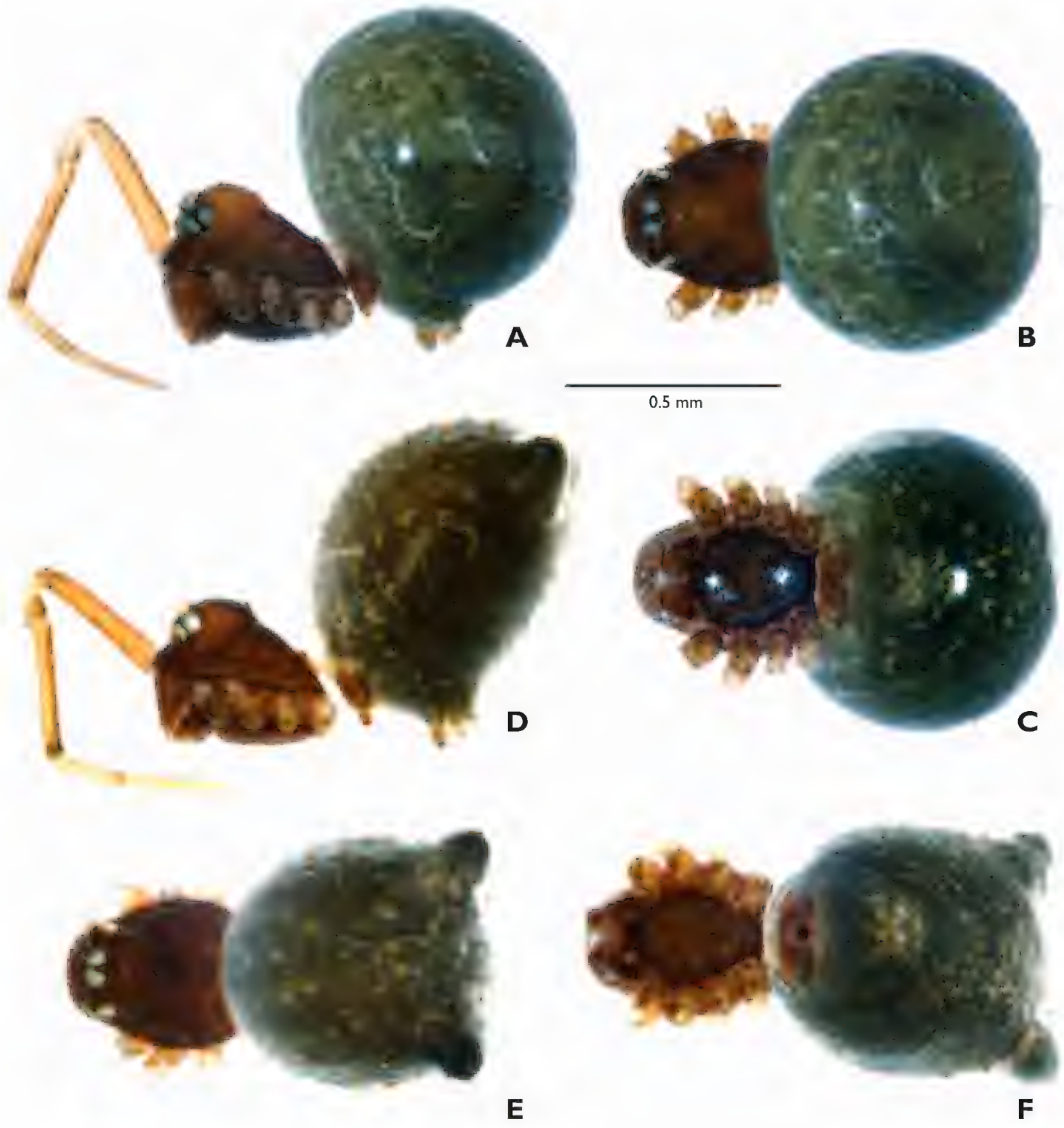


Figure 86. A-C, *Crassignatha yamu* sp. n. from Yamu He; D-F, *Crassignatha ertou* sp. n. from Zaotang He. A, D, female, lateral; B, E, female, dorsal; C, F, female, ventral.

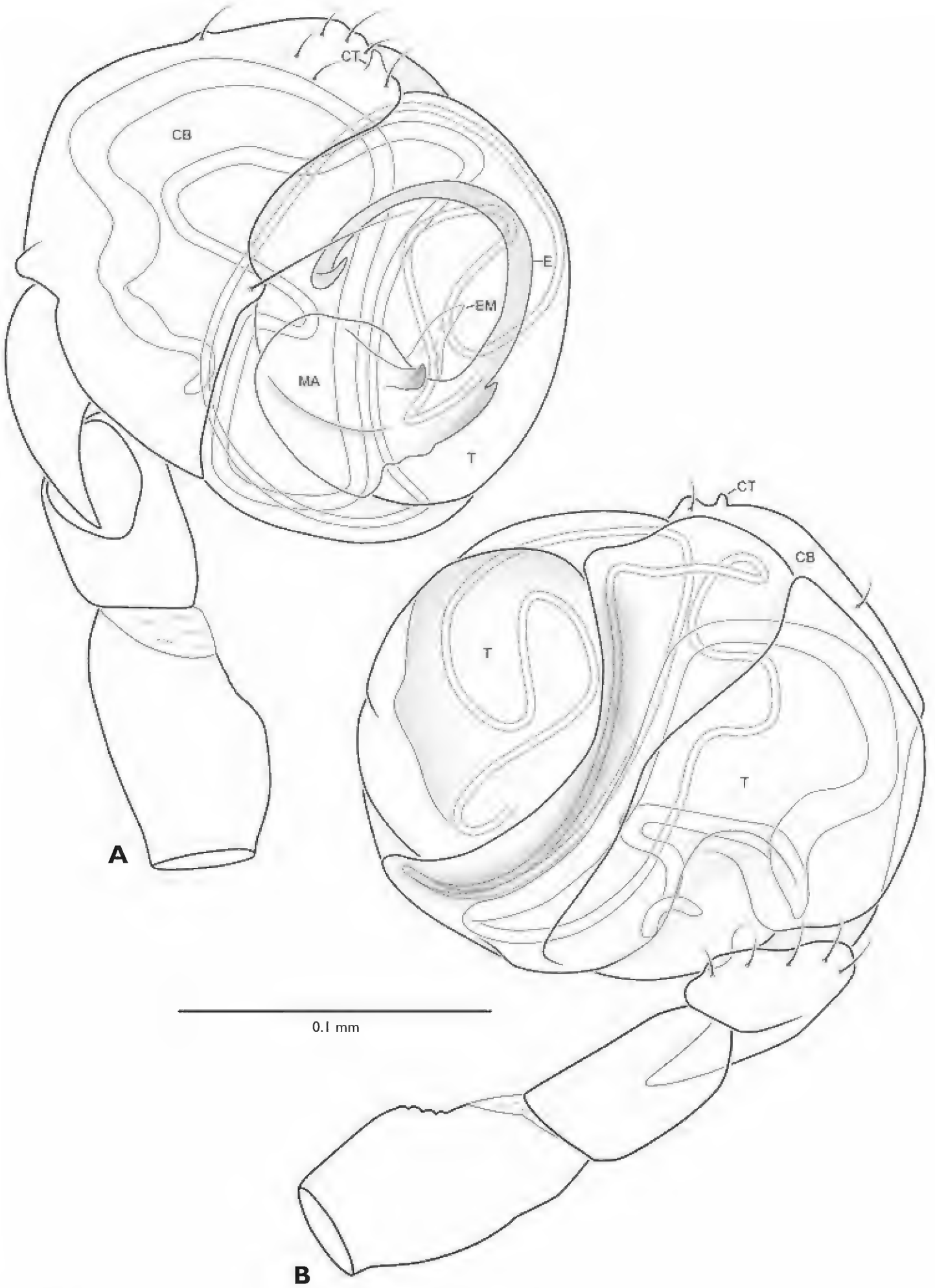


Figure 87. *Crassignatha yamu* sp. n. from Yamu He, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum.

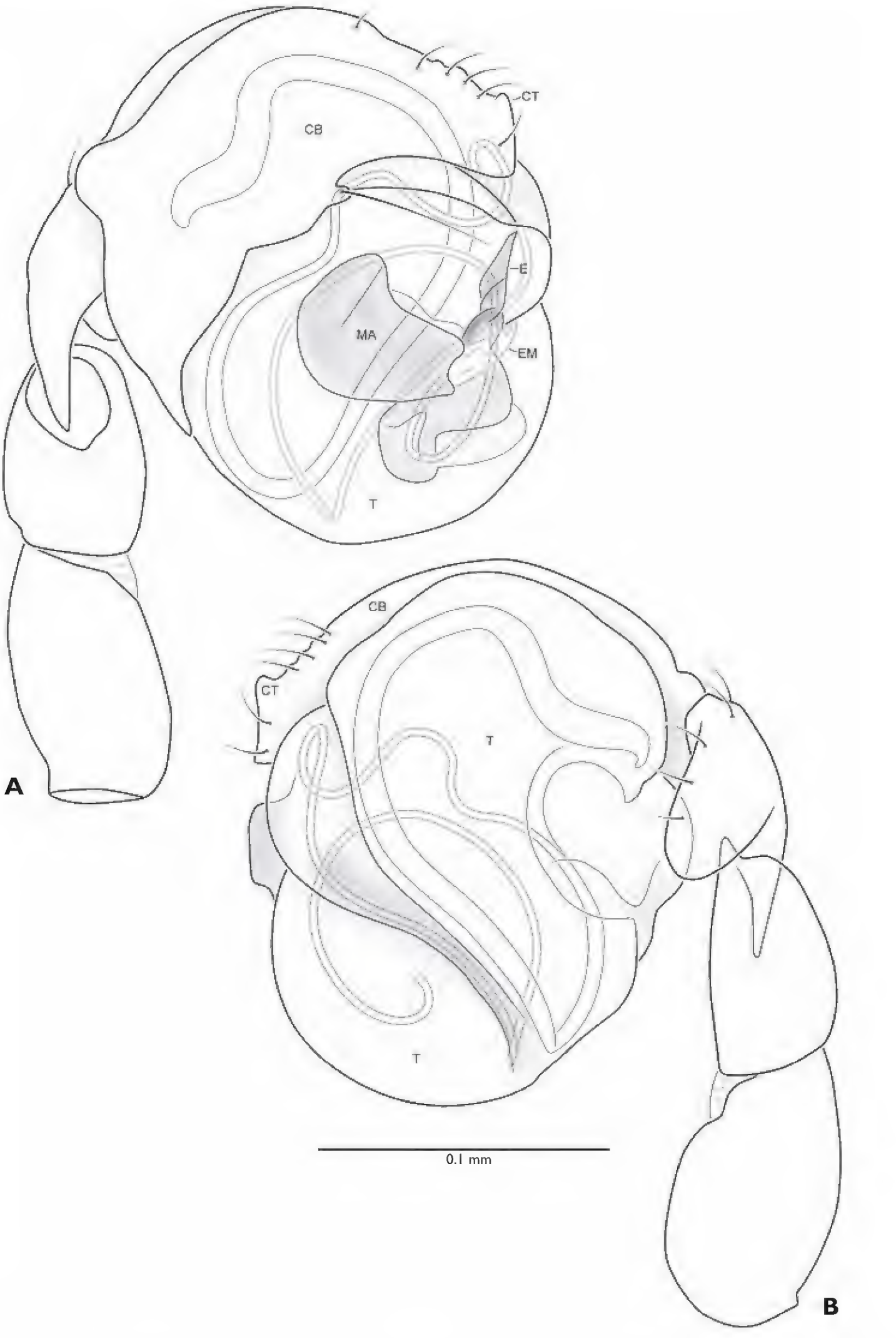


Figure 88. *Crassignatha ertou* sp. n. from Zaotang He, male palp. A, prolateral; B, retrolateral. CB: cymbium; CT: cymbial tooth; E: embolus; EM: embolic membrane; MA: median apophysis; T: tegulum.

Figure 89. A, B, *Crassignatha ertou* sp. n. from Zaotang He; C, D, *Crassignatha gudu* sp. n. from Zaotang He; E, F, *Crassignatha longtou* sp. n. from Yamu He. A, C, E, epigynum, ventral view; B, D, F, cleared vulva, dorsal view. CD: copulatory duct; S: spermatheca.

Figure 90. *Crassignatha longtou* sp. n. from Yamu He, female. A, lateral; B, dorsal; C, ventral.

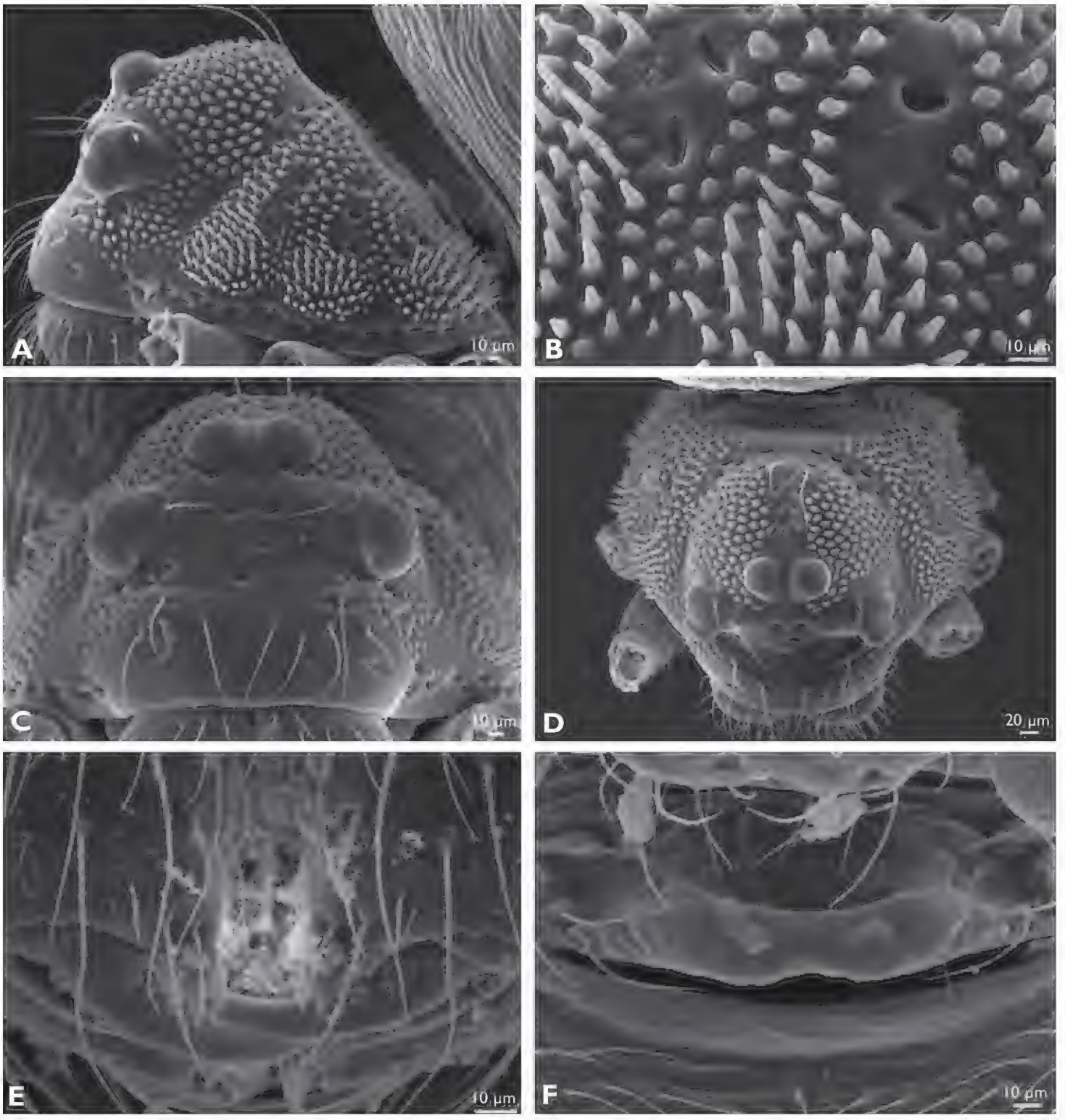


Figure 91. *Crassignatha longtou* sp. n. from Yamu He, SEM of female. A, prosoma, lateral; B, detail, carapace, lateral; C, prosoma, anterior; D, prosoma, dorsal; E, chelicerae, distal part showing bifid tooth; F, epigynum.

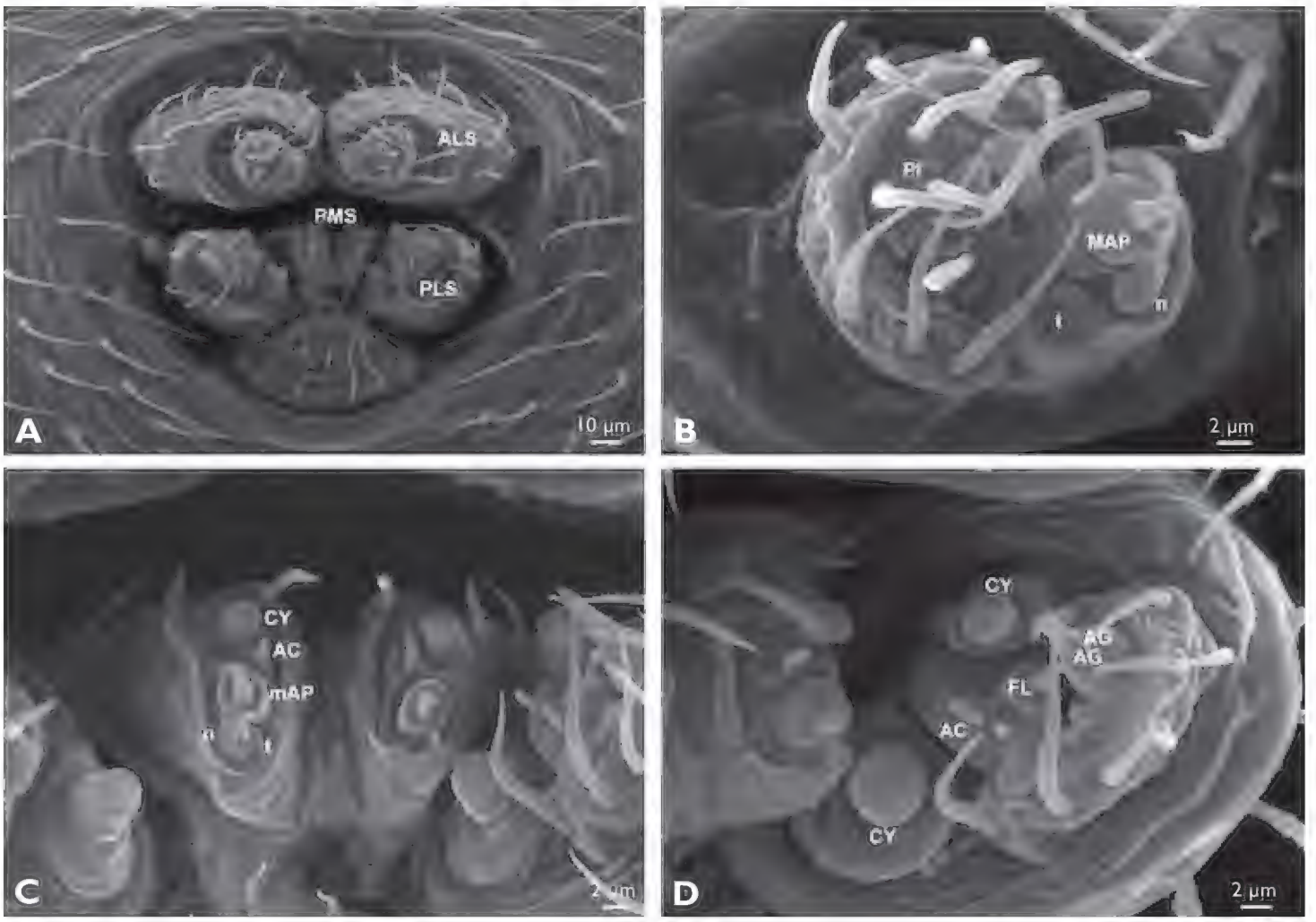


Figure 92. *Crassignatha longtou* sp. n. from Yamu He, SEM of female spinnerets. A, spinnerets; B, ALS; C, PMS; D, PLS. AC: aciniform gland spigot; AG: aggregate gland spigot; ALS: anterior lateral spinneret; CY: cylindrical gland spigot; FL: flagelliform gland spigot; MAP: major ampullate gland spigot; mAP: minor ampullate gland spigot; n: nubbin; PI: piriform gland spigot; PLS: posterior lateral spinneret; PMS: posterior median spinneret; t: tartipore.

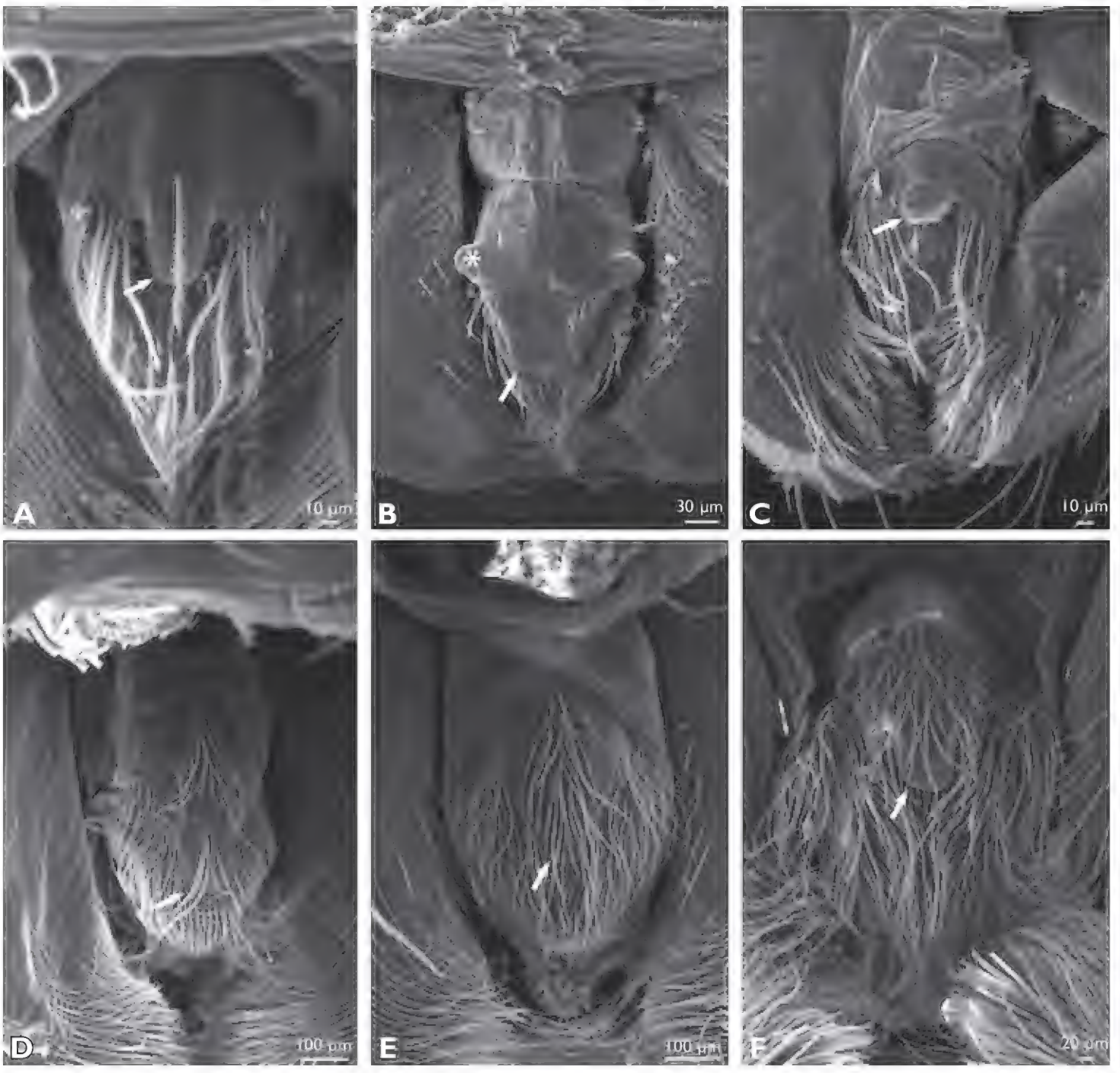


Figure 93. Labra of araneomorph spiders. A, Dysderidae: *Harpactea holmbergi* (Scopoli, 1763); B, Archaeidae: *Austrarchaea* sp.; C, Synotaxidae: *Pahoroides* sp.; D, Phyxelididae: *Ambohima* sp.; E, Amphinectidae: *Neolana* sp.; F, Ctenidae: *Anahita* sp. Arrows indicate labral tongue; asterisk in B indicates one of pair of lateral protuberances.

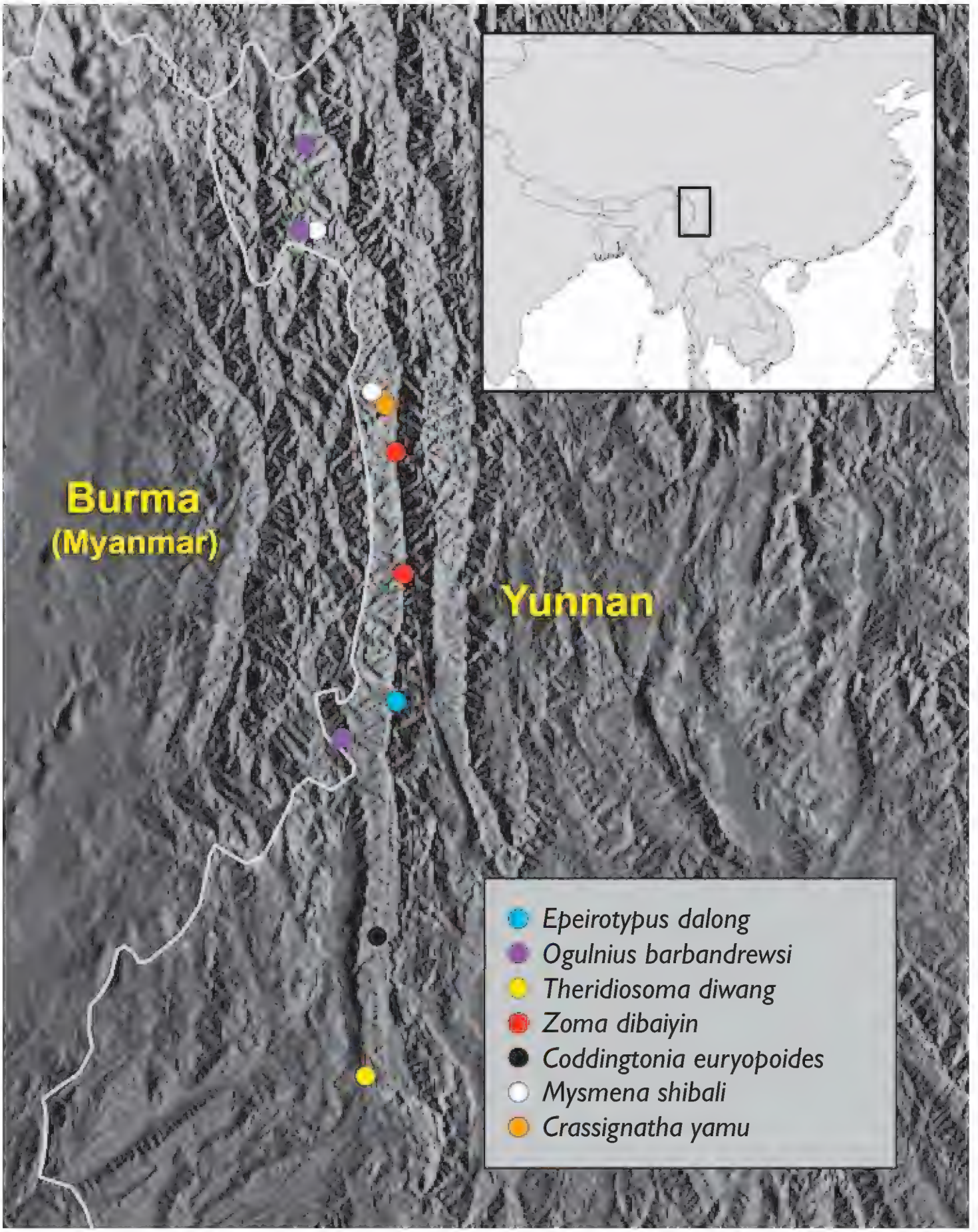


Figure 94. Distribution map, inset map shows study area. Blue: *Epeirotypus dalong* sp. n.; purple: *Ogulnius barbandrewsi* sp. n.; yellow: *Theridiosoma diwang* sp. n.; red: *Zoma dibaiyin* sp. n.; black: *Coddingtonia euryopoides* sp. n.; white: *Mysmena shibali* sp. n.; orange: *Crassignatha yamu* sp. n.

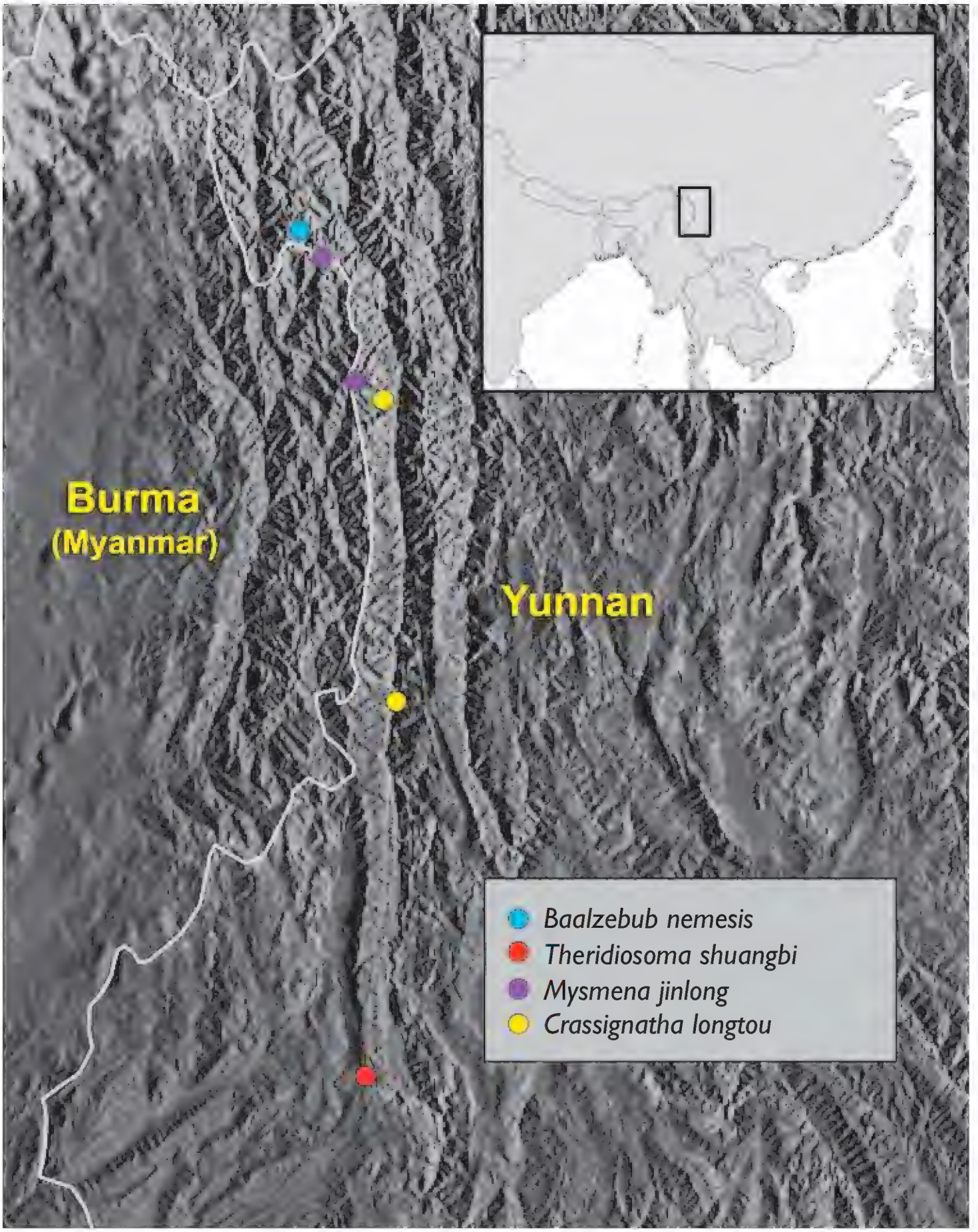


Figure 95. Distribution map, inset map shows study area. Blue: *Baalzebub nemesis* sp. n.; red: *Theridiosoma shuangbi* sp. n.; purple: *Mysmena jinlong* sp. n.; yellow: *Crassignatha longtou* sp. n.

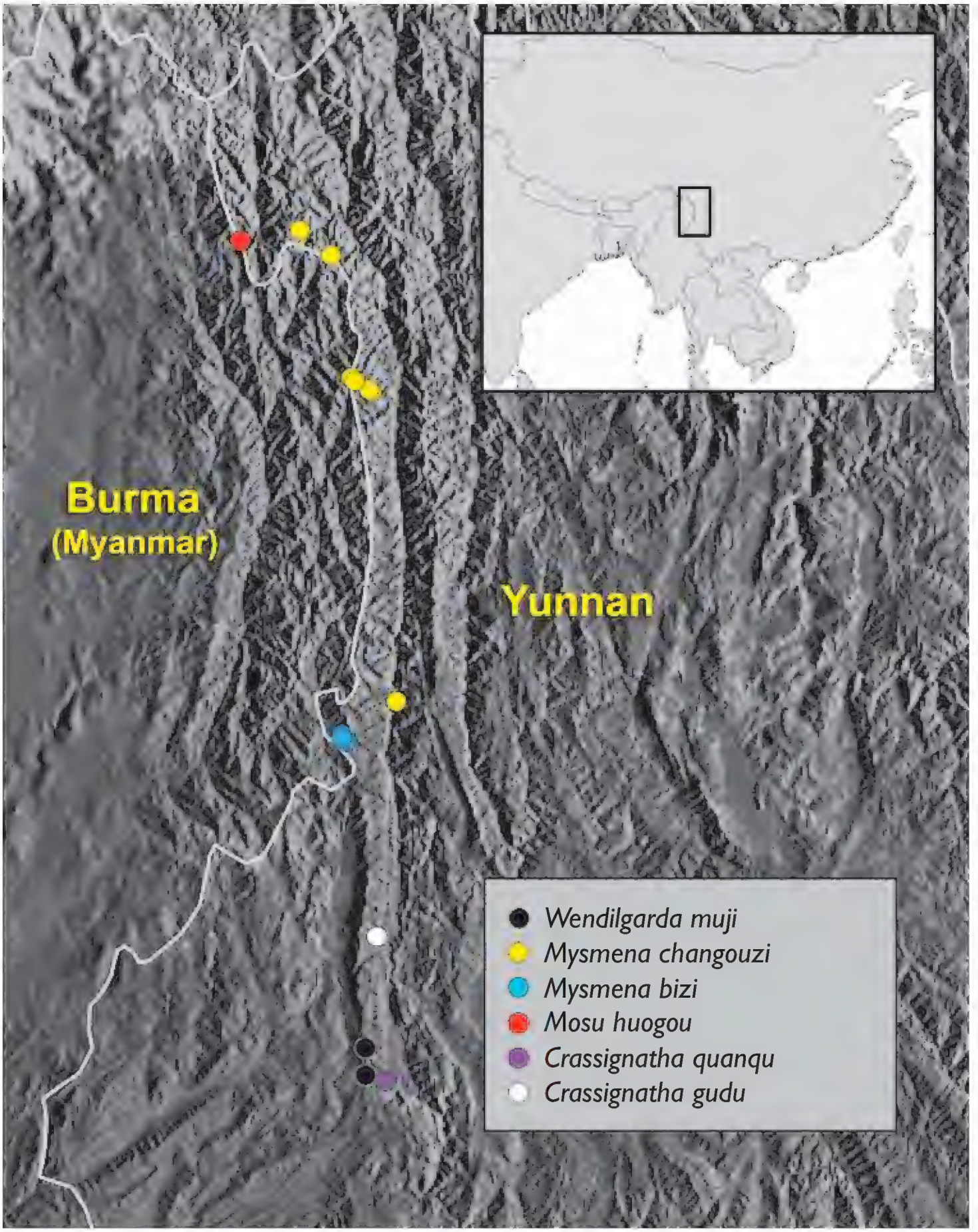


Figure 96. Distribution map, inset map shows study area. Black: *Wendilgarda muji* sp. n.; yellow: *Mysmena changouzi* sp. n.; blue: *Mysmena bizi* sp. n.; red: *Mosu huogou* sp. n.; purple: *Crassignatha quanqu* sp. n.; white: *Crassignatha gudu* sp. n.

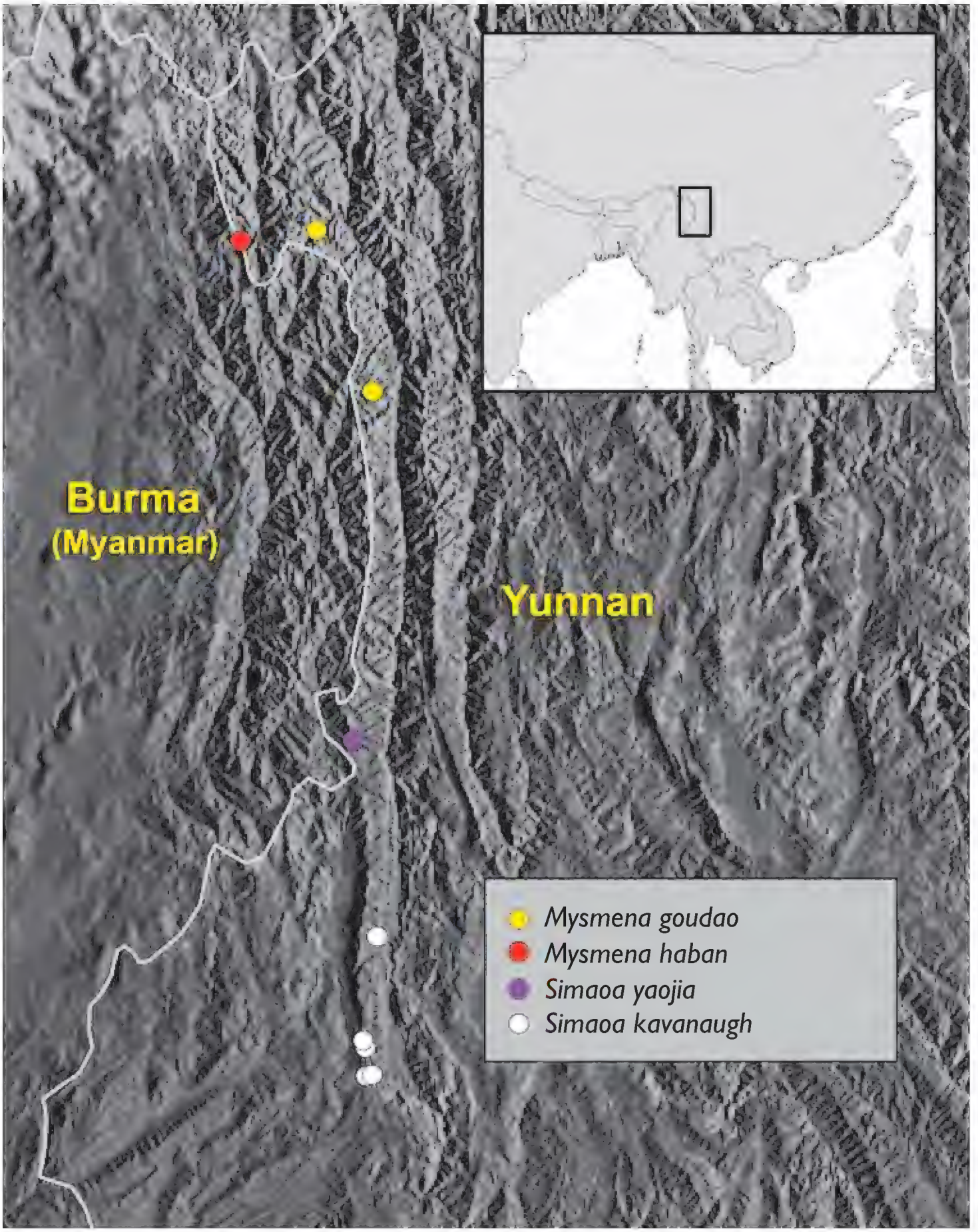


Figure 97. Distribution map, inset map shows study area. Yellow: *Mysmena goudao* sp. n.; red: *Mysmena haban* sp. n.; purple: *Simaoa yaojia* sp. n.; white: *Simaoa kavanaugh* sp. n.

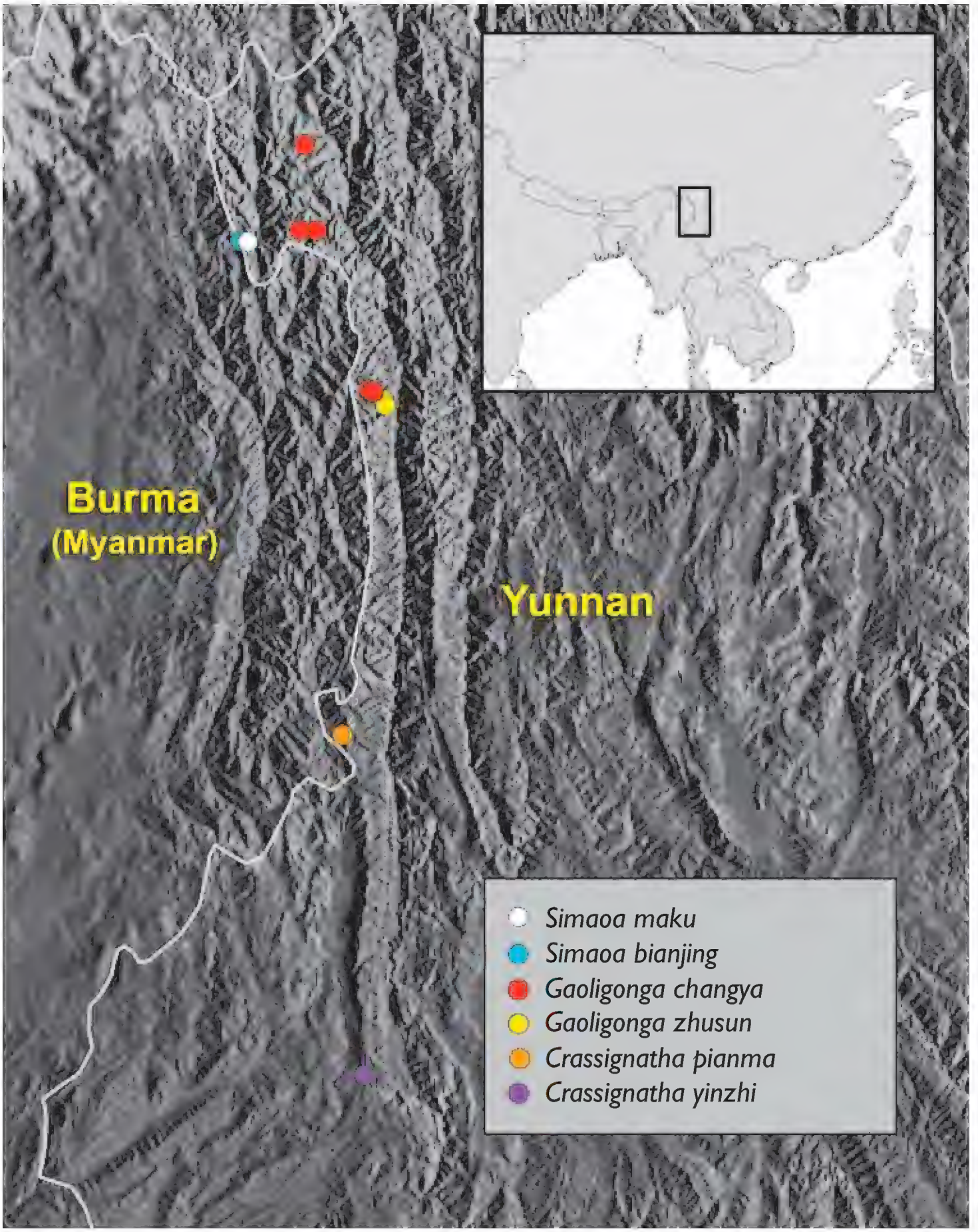


Figure 98. Distribution map, inset map shows study area. White: *Simaoa maku* sp. n.; blue: *Simaoa bianjing* sp. n.; red: *Gaoligonga changya* sp. n.; yellow: *Gaoligonga zhusun* sp. n.; orange: *Crassignatha pianma* sp. n.; purple: *Crassignatha yinzhi* sp. n.

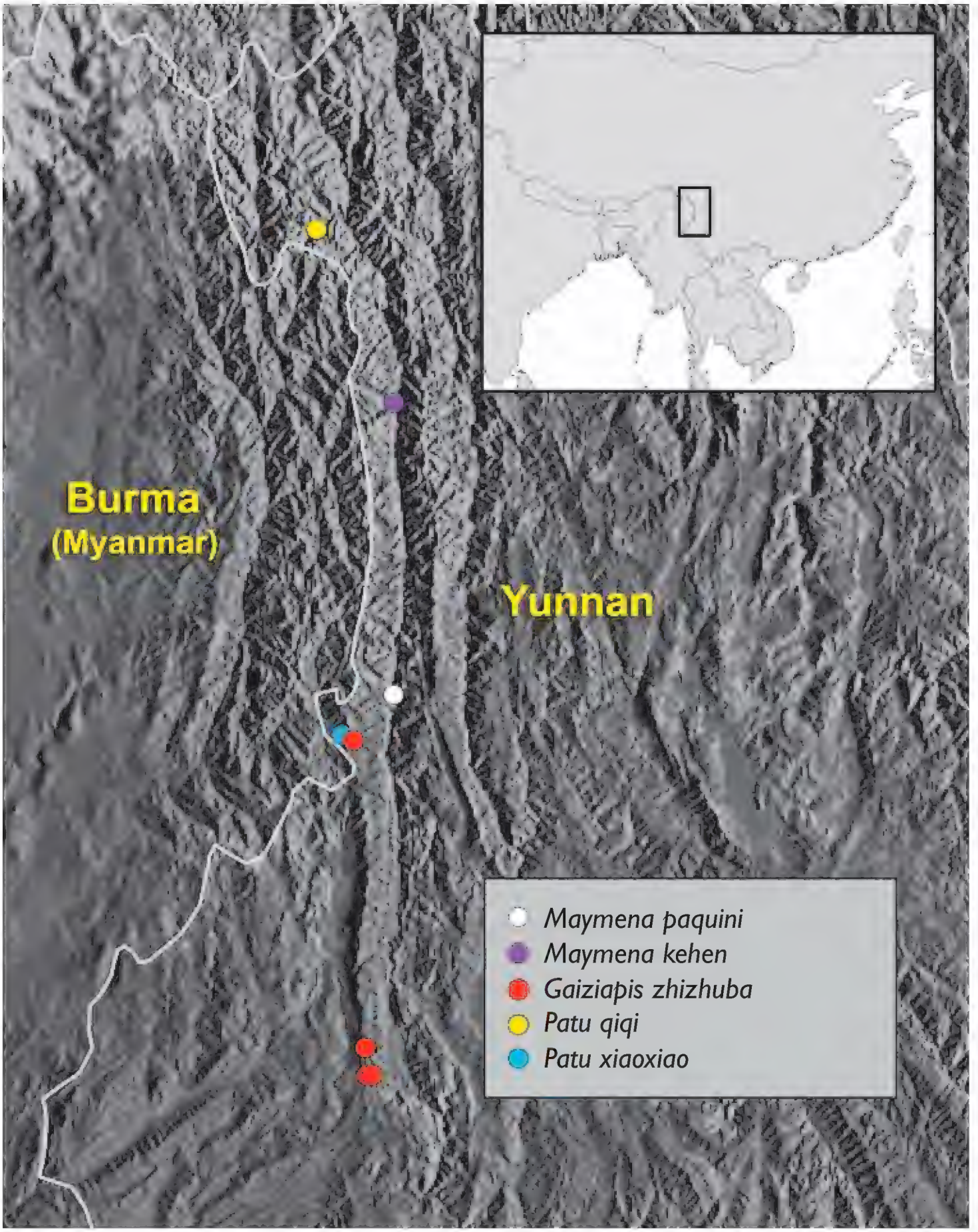


Figure 99. Distribution map, inset map shows study area. White: *Maymena paquini* sp. n.; purple: *Maymena kehen* sp. n.; red: *Gaiziapis zhizhuba* sp. n.; yellow: *Patu qiqi* sp. n.; blue: *Patu xiaoxiao* sp. n.

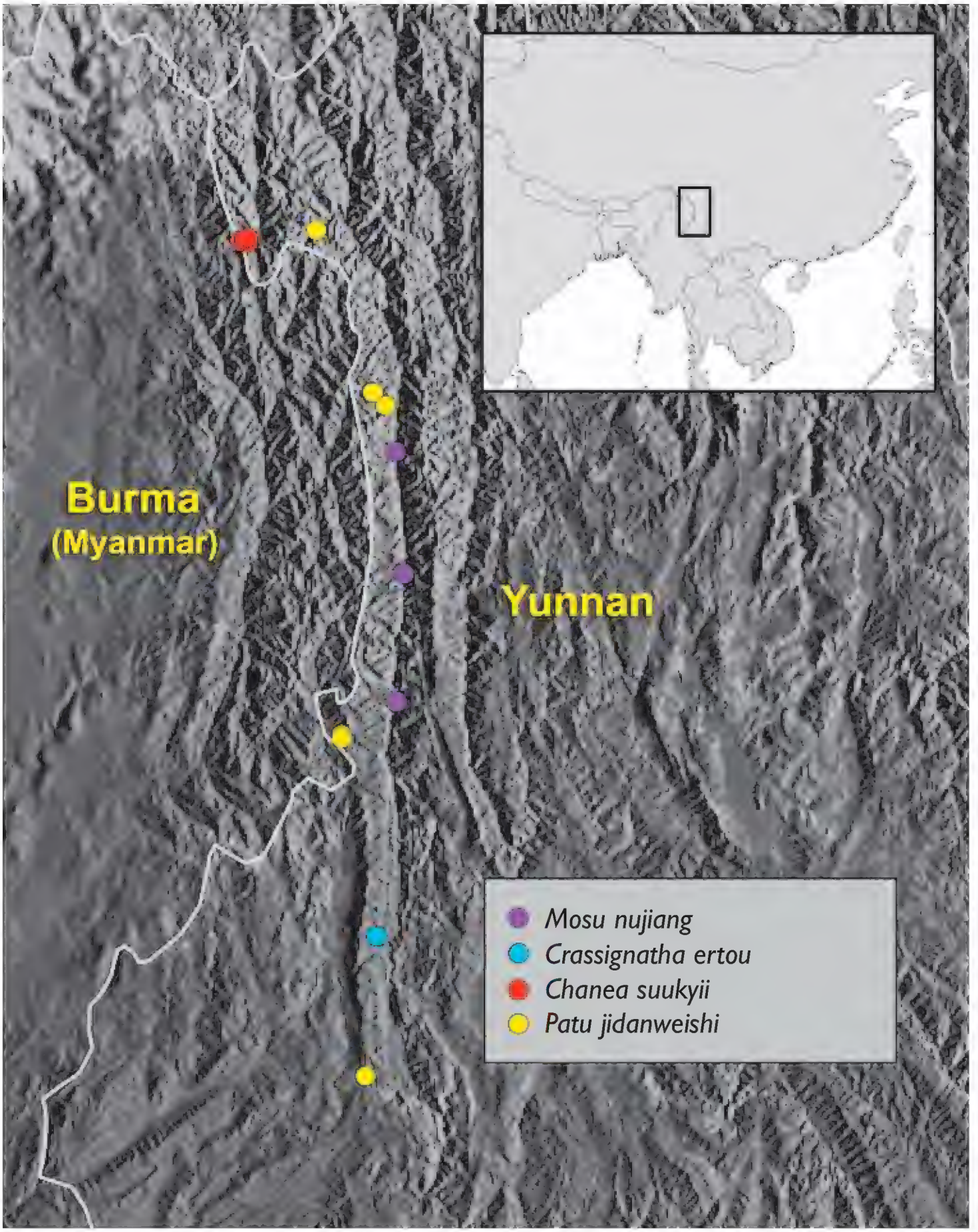


Figure 100. Distribution map, inset map shows study area. Purple: *Mosu nujiang* sp. n.; blue: *Crassignatha ertou* sp. n.; red: *Chanea suukyii* sp. n.; yellow: *Patu jidanweishi* sp. n

Appendix A.

Leg measurements of micro-orbweavers from the Gaoligongshan. One specimen or each sex (when available) was measured.

***Epeirotypus dalong* sp. n.**

Male

	I	II	III	IV	
Femur	1.14	0.96	0.58	0.76	
Patella	0.36	0.35	0.24	0.28	
Tibia	0.90	0.71	0.33	0.50	
Metatarsus	0.83	0.69	0.45	0.53	
Tarsus	0.38	0.35	0.27	0.28	
Total	**3.61**	**3.06**	**1.87**	**2.34**	

Female

	I	II	III	IV	Palp
Femur	0.99	0.82	0.51	0.79	0.32
Patella	0.34	0.34	0.25	0.25	0.12
Tibia	0.67	0.52	0.30	0.50	0.20
Metatarsus	0.67	0.57	0.40	0.50	–
Tarsus	0.34	0.33	0.28	0.28	0.37
Total	**3.01**	**2.58**	**1.73**	**2.31**	**1.01**

***Ogulnius barbandrewsi* sp. n.**

Male

	I	II	III	IV	
Femur	0.42	0.37	0.25	0.36	
Patella	0.16	0.18	0.13	0.17	
Tibia	0.25	0.22	0.16	0.23	
Metatarsus	0.26	0.25	0.18	0.22	
Tarsus	0.17	0.28	0.16	0.16	
Total	**1.26**	**1.30**	**0.88**	**1.13**	

Female

	I	II	III	IV	Palp
Femur	0.39	0.36	0.27	0.44	0.15
Patella	0.18	0.17	0.12	0.17	0.06
Tibia	0.21	0.20	0.17	0.08	0.10
Metatarsus	0.22	0.23	0.20	0.25	–
Tarsus	0.17	0.20	0.17	0.19	0.20
Total	**1.17**	**1.16**	**0.93**	**1.13**	**0.51**

***Baalzebub nemesis* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.78	0.68	0.42	0.67	0.27
Patella	0.29	0.27	0.22	0.24	0.11
Tibia	0.50	0.41	0.25	0.41	0.20
Metatarsus	0.48	0.43	0.32	0.42	–
Tarsus	0.31	0.29	0.25	0.26	0.34
Total	**2.35**	**2.08**	**1.45**	**2.00**	**0.92**

***Theridiosoma diwang* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.61	0.55	0.33	0.55	0.22
Patella	0.24	0.24	0.19	0.23	0.08
Tibia	0.41	0.37	0.18	0.36	0.16
Metatarsus	0.37	0.37	0.27	0.33	–
Tarsus	0.24	0.24	0.20	0.22	0.29
Total	**1.87**	**1.76**	**1.17**	**1.69**	**0.75**

***Theridiosoma wubi* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.55	0.50	0.33	0.50	0.23
Patella	0.22	0.22	0.16	0.20	0.09
Tibia	0.38	0.35	0.20	0.24	0.15
Metatarsus	0.35	0.35	0.26	0.31	–
Tarsus	0.27	0.24	0.22	0.21	0.28
Total	**1.76**	**1.66**	**1.15**	**1.45**	**0.74**

***Theridiosoma shuangbi* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.61	0.44	0.25	0.40	0.21
Patella	0.25	0.18	0.14	0.19	0.09
Tibia	0.39	0.26	0.14	0.26	0.14
Metatarsus	0.29	0.27	0.19	0.22	–
Tarsus	0.20	0.19	0.15	0.16	0.26
Total	**1.73**	**1.33**	**0.87**	**1.23**	**0.70**

***Zoma dibaiyin* sp. n.**

Male

	I	II	III	IV	
Femur	0.77	0.64	0.35	0.48	
Patella	0.27	0.26	0.17	0.20	
Tibia	0.55	0.47	0.22	0.32	
Metatarsus	0.49	0.42	0.26	0.31	
Tarsus	0.28	0.28	0.22	0.22	
Total	**2.35**	**2.07**	**1.22**	**1.53**	

Female

	I	II	III	IV	Palp
Femur	0.64	0.59	0.33	0.56	0.25
Patella	0.26	0.25	0.20	0.25	0.09
Tibia	0.44	0.39	0.20	0.35	0.16
Metatarsus	0.39	0.37	0.25	0.31	–
Tarsus	0.26	0.27	0.21	0.22	0.30
Total	**1.99**	**1.87**	**1.18**	**1.69**	**0.80**

***Wendilgarda muji* sp. n.**

Male

	I	II	III	IV	
Femur	0.67	0.60	0.44	0.56	
Patella	0.26	0.23	0.20	0.21	
Tibia	0.56	0.45	0.28	0.36	
Metatarsus	0.44	0.42	0.31	0.39	
Tarsus	0.31	0.31	0.23	0.24	
Total	**2.23**	**2.01**	**1.46**	**1.76**	

Female

	I	II	III	IV	Palp
Femur	0.62	0.54	0.38	0.56	0.19
Patella	0.25	0.23	0.19	0.25	0.08
Tibia	0.43	0.36	0.23	0.33	0.13
Metatarsus	0.35	0.32	0.26	0.35	–
Tarsus	0.27	0.26	0.22	0.23	0.25
Total	**1.91**	**1.70**	**1.28**	**1.72**	**0.64**

***Coddingtonia euryopoides* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.63	0.54	0.41	0.53	0.21
Patella	0.25	0.23	0.18	0.23	0.08
Tibia	0.41	0.36	0.25	0.38	0.13
Metatarsus	0.38	0.33	0.27	0.33	–

Tarsus	0.30	0.29	0.24	0.25	0.28
Total	**1.95**	**1.74**	**1.35**	**1.71**	**0.70**

***Mysmena changouzi* sp. n.**

Male

	I	II	III	IV	
Femur	0.37	0.33	0.23	0.32	
Patella	0.15	0.14	0.11	0.12	
Tibia	0.27	0.22	0.15	0.21	
Metatarsus	0.19	0.17	0.19	0.16	
Tarsus	0.14	0.23	0.20	0.21	
Total	**1.12**	**1.09**	**0.88**	**1.02**	

Female

	I	II	III	IV	Palp
Femur	0.41	0.34	0.25	0.36	0.11
Patella	0.15	0.14	0.11	0.07	0.05
Tibia	0.26	0.21	0.15	0.23	0.07
Metatarsus	0.20	0.16	0.14	0.17	–
Tarsus	0.24	0.23	0.20	0.21	0.13
Total	**1.26**	**1.08**	**0.84**	**1.03**	**0.36**

***Mysmena jinlong* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.42	0.35	0.25	0.33	0.10
Patella	0.16	0.16	0.11	0.12	0.05
Tibia	0.28	0.24	0.15	0.22	0.07
Metatarsus	0.21	0.19	0.16	0.19	–
Tarsus	0.22	0.21	0.19	0.20	0.12
Total	**1.28**	**1.15**	**0.85**	**1.05**	**0.34**

***Mysmena bizi* sp. n.**

Male

	I	II	III	IV	
Femur	0.38	0.30	0.22	0.29	
Patella	0.15	0.13	0.11	0.12	
Tibia	0.28	0.22	0.14	0.18	
Metatarsus	0.18	0.15	0.13	0.15	
Tarsus	0.22	0.20	0.18	0.19	
Total	**1.21**	**1.00**	**0.77**	**0.92**	

Female

	I	II	III	IV	Palp
Femur	0.41	0.33	0.21	0.32	0.11

Patella	0.15	0.14	0.12	0.11	0.05
Tibia	0.26	0.22	0.15	0.20	0.08
Metatarsus	0.20	0.18	0.15	0.18	–
Tarsus	0.23	0.21	0.19	0.19	0.12
Total	**1.25**	**1.08**	**0.82**	**1.00**	**0.36**

***Mysmena goudao* sp. n.**

Male

	I	II	III	IV	
Femur	0.46	0.38	0.27	0.35	
Patella	0.19		0.12	0.12	
Tibia	0.34	0.25	0.17	0.22	
Metatarsus	0.31	0.20	0.16	0.19	
Tarsus	0.17	0.24	0.21	0.22	
Total	**1.46**	**1.23**	**0.92**	**1.09**	

Female

	I	II	III	IV	Palp
Femur	0.54	0.46	0.32	0.43	0.14
Patella	0.21	0.18	0.14	0.16	0.08
Tibia	0.38	0.30	0.29	0.27	0.09
Metatarsus	0.29	0.25	0.19	0.23	–
Tarsus	0.29	0.27	0.23	0.25	0.18
Total	**1.70**	**1.46**	**1.17**	**1.34**	**0.48**

***Mysmena haban* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.33	0.27	0.18	0.24	0.11
Patella	0.13	0.12	0.10	0.10	0.04
Tibia	0.22	0.18	0.11	0.16	0.07
Metatarsus	0.17	0.15	0.15	0.14	–
Tarsus	0.18	0.18	0.14	0.15	0.10
Total	**1.02**	**0.90**	**0.66**	**0.79**	**0.32**

***Mysmena shibali* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.36	0.28	0.21	0.31	0.13
Patella	0.15	0.14	0.10	0.12	0.06
Tibia	0.24	0.20	0.13	0.19	0.08
Metatarsus	0.20	0.20	0.14	0.18	–
Tarsus	0.21	0.19	0.17	0.19	0.11
Total	**1.15**	**1.01**	**0.75**	**0.98**	**0.38**

***Gaoligonga changya* sp. n.**

Male

	I	II	III	IV	
Femur	0.49	0.44	0.28	0.36	
Patella	0.21	0.18	0.13	0.13	
Tibia	0.36	0.30	0.17	0.23	
Metatarsus	0.24	0.21	0.17	0.19	
Tarsus	0.34	0.28	0.23	0.23	
Total	**1.64**	**1.41**	**0.98**	**1.14**	

Female

	I	II	III	IV	Palp
Femur	0.53	0.46	0.29	0.40	0.17
Patella	0.20	0.19	0.13	0.12	0.06
Tibia	0.35	0.30	0.18	0.29	0.09
Metatarsus	0.26	0.23	0.18	0.22	–
Tarsus	0.29	0.27	0.21	0.25	0.18
Total	**1.63**	**1.45**	**0.99**	**1.28**	**0.50**

***Gaoligonga zhusun* sp. n.**

Male

	I	II	III	IV	
Femur	0.35	0.31	0.20	0.25	
Patella	0.15	0.14	0.09	0.09	
Tibia	0.26	0.21	0.13	0.17	
Metatarsus	0.19	0.16	0.13	0.14	
Tarsus	0.24	0.20	0.15	0.17	
Total	**1.18**	**1.02**	**0.70**	**0.81**	

Female

	I	II	III	IV	Palp
Femur	0.45	0.37	0.25	0.33	0.14
Patella	0.17	0.15	0.11	0.12	0.05
Tibia	0.29	0.24	0.14	0.21	0.07
Metatarsus	0.23	0.18	0.15	0.17	–
Tarsus	0.23	0.22	0.18	0.19	0.14
Total	**1.37**	**1.16**	**0.82**	**1.02**	**0.40**

***Mosu nujiang* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.41	0.35	0.25	0.33	0.13
Patella	0.16	0.15	0.11	0.13	0.05
Tibia	0.26	0.22	0.15	0.22	0.08
Metatarsus	0.21	0.17	0.14	0.18	–

Tarsus	0.23	0.22	0.18	0.20	0.13
Total	**1.26**	**1.11**	**0.82**	**1.05**	**0.39**

***Mosu huogou* sp. n.**

Female

	I	II	III	IV	Palp
Femur	0.48	0.42	0.31	0.40	0.14
Patella	0.20	0.17	0.14	0.14	0.05
Tibia	0.31	0.27	0.16	0.27	0.08
Metatarsus	0.23	0.20	0.15	0.21	–
Tarsus	0.29	0.26	0.21	0.23	0.15
Total	**1.50**	**1.31**	**0.97**	**1.25**	**0.42**

***Simaoa yaojia* sp. n.**

Male

	I	II	III	IV	
Femur	0.38	0.31	0.21	0.28	
Patella	0.16	0.14	0.10	0.10	
Tibia	0.26	0.21	0.12	0.18	
Metatarsus	0.17	0.15	0.13	0.14	
Tarsus	0.23	0.22	0.18	0.18	
Total	**1.19**	**1.02**	**0.73**	**0.88**	

Female

	I	II	III	IV	Palp
Femur	0.36	0.32	0.22	0.30	0.13
Patella	0.16	0.15	0.11	0.11	0.05
Tibia	0.25	0.21	0.14	0.20	0.08
Metatarsus	0.18	0.16	0.14	0.17	–
Tarsus	0.24	0.21	0.17	0.19	0.11
Total	**1.18**	**1.05**	**0.77**	**0.97**	**0.36**

***Simaoa kavanaugh* sp. n.**

Male

	I	II	III	IV	
Femur	0.38	0.32	0.22	0.29	
Patella	0.16	0.14	0.09	0.10	
Tibia	0.28	0.22	0.13	0.18	
Metatarsus	0.17	0.15	0.12	0.15	
Tarsus	0.23	0.22	0.18	0.19	
Total	**1.21**	**1.05**	**0.74**	**0.91**	

Female

	I	II	III	IV	Palp
Femur	0.37	0.31	0.23	0.31	0.12

Patella	0.16	0.15	0.11	0.12	0.05
Tibia	0.24	0.21	0.14	0.19	0.07
Metatarsus	0.17	0.16	0.13	0.17	–
Tarsus	0.21	0.19	0.18	0.19	0.11
Total	**1.14**	**1.01**	**0.78**	**0.97**	**0.35**

Simaoa maku sp. n.

Female

	I	II	III	IV	Palp
Femur	0.37	0.30	0.20	0.27	0.11
Patella	0.14	0.13	0.10	0.11	0.05
Tibia	0.22	0.19	0.12	0.18	0.07
Metatarsus	0.19	0.15	0.12	0.16	–
Tarsus	0.22	0.20	0.17	0.18	0.11
Total	**1.13**	**0.96**	**0.70**	**0.90**	**0.33**

Simaoa bianjing sp. n.

Female

	I	II	III	IV	Palp
Femur	0.34	0.29	0.20	0.29	0.11
Patella	0.14	0.13	0.10	0.12	0.04
Tibia	0.22	0.20	0.12	0.18	0.08
Metatarsus	0.16	0.15	0.12	0.15	–
Tarsus	0.20	0.19	0.16	0.13	0.12
Total	**1.06**	**0.95**	**0.69**	**0.86**	**0.35**

Chanea suukyii sp. n.

Male

	I	II	III	IV	
Femur	0.32	0.28	0.19	0.24	
Patella	0.13	0.11	0.10	0.11	
Tibia	0.23	0.20	0.71	0.16	
Metatarsus	0.18	0.15	0.11	0.13	
Tarsus	0.19	0.17	0.14	0.15	
Total	**1.04**	**0.90**	**1.25**	**0.78**	

Female

	I	II	III	IV	Palp
Femur	0.41	0.35	0.24	0.33	0.14
Patella	0.16	0.15	0.12	0.11	0.04
Tibia	0.29	0.14	0.15	0.21	0.08
Metatarsus	0.22	0.19	0.15	0.18	–
Tarsus	0.24	0.21	0.17	0.19	0.13
Total	**1.30**	**1.02**	**0.82**	**1.02**	**0.38**

***Maymena paquini* sp. n.**

Male

	I	II	III	IV	
Femur	2.08	1.81	1.29	1.40	
Patella	0.65	0.58	0.38	0.38	
Tibia	1.78	1.46	0.85	0.95	
Metatarsus	1.26	1.10	0.73	0.81	
Tarsus	1.14	0.93	0.65	0.63	
Total	**6.90**	**5.88**	**3.89**	**4.16**	

Female

	I	II	III	IV	Palp
Femur	1.96	1.74	1.28	1.48	0.43
Patella	0.63	0.60	0.39	0.65	0.14
Tibia	1.68	1.39	0.86	1.01	0.33
Metatarsus	1.30	1.13	0.76	0.86	0.50
Tarsus	1.10	0.96	0.68	0.64	–
Total	**6.66**	**5.81**	**3.96**	**4.64**	**1.39**

***Maymena kehen* sp. n.**

Female

	I	II	III	IV	Palp
Femur	1.94	1.68	1.20	1.43	0.45
Patella	0.63	0.60	0.40	0.39	0.15
Tibia	1.64	1.36	0.83	0.94	0.29
Metatarsus	1.20	1.03	0.71	0.76	–
Tarsus	1.00	0.84	0.59	0.56	0.43
Total	**6.40**	**5.50**	**3.73**	**4.08**	**1.31**

***Gaiziapis zhizhuba* sp. n.**

Male

	I	II	III	IV	
Femur	0.49	0.40	0.32	0.39	
Patella	0.17	0.15	0.14	0.14	
Tibia	0.39	0.32	0.26	0.34	
Metatarsus	0.19	0.17	0.15	0.17	
Tarsus	0.32	0.31	0.27	0.29	
Total	**1.56**	**1.35**	**1.13**	**1.33**	

Female

	I	II	III	IV	
Femur	0.56	0.45	0.37	0.47	
Patella	0.16	0.14	0.13	0.15	
Tibia	0.44	0.35	0.29	0.38	
Metatarsus	0.22	0.19	0.18	0.20	

Tarsus	0.35	0.34	0.28	0.32	
Total	**1.73**	**1.47**	**1.25**	**1.51**	

***Patu jidanweishi* sp. n.**

Male

	I	II	III	IV	
Femur	0.28	0.24	0.19	0.22	
Patella	0.12	0.12	0.09	0.09	
Tibia	0.11	0.16	0.12	0.16	
Metatarsus	0.15	0.12	0.11	0.11	
Tarsus	0.21	0.19	0.16	0.16	
Total	**0.86**	**0.82**	**0.66**	**0.74**	

Female

	I	II	III	IV	
Femur	0.28	0.23	0.19	0.26	
Patella	0.12	0.11	0.09	0.11	
Tibia	0.18	0.16	0.13	0.17	
Metatarsus	0.14	0.14	0.11	0.13	
Tarsus	0.21	0.19	0.16	0.18	
Total	**0.93**	**0.82**	**0.67**	**0.84**	

***Patu qiqi* sp. n.**

Male

	I	II	III	IV	
Femur	0.25	0.20	0.16	0.20	
Patella	0.09	0.09	0.08	0.08	
Tibia	0.15	0.12	0.09	0.12	
Metatarsus	0.11	0.10	0.08	0.09	
Tarsus	0.15	0.14	0.13	0.13	
Total	**0.74**	**0.64**	**0.54**	**0.62**	

Female

	I	II	III	IV	
Femur	0.23	0.20	0.17	0.21	
Patella	0.10	0.09	0.09	0.10	
Tibia	0.15	0.13	0.11	0.15	
Metatarsus	0.11	0.11	0.09	0.11	
Tarsus	0.16	0.15	0.14	0.15	
Total	**0.74**	**0.68**	**0.59**	**0.71**	

***Patu xiaoxiao* sp. n.**

Female

	I	II	III	IV	
Femur	0.24	0.21	0.16	0.23	

Patella	0.10	0.15	0.08	0.10	
Tibia	0.17	0.15	0.12	0.17	
Metatarsus	0.13	0.11	0.10	0.10	
Tarsus	0.14	0.15	0.13	0.15	
Total	**0.77**	**0.76**	**0.59**	**0.73**	

***Crassignatha pianma* sp. n.**

Male

	I	II	III	IV	
Femur	0.46	0.38	0.29	0.38	
Patella	0.16	0.15	0.12	0.13	
Tibia	0.34	0.27	0.18	0.24	
Metatarsus	0.23	0.18	0.15	0.17	
Tarsus	0.28	0.28	0.23	0.23	
Total	**1.47**	**1.26**	**0.97**	**1.15**	

Female

	I	II	III	IV	
Femur	0.63	0.50	0.36	0.48	
Patella	0.17	0.16	0.14	0.15	
Tibia	0.44	0.36	0.24	0.32	
Metatarsus	0.28	0.24	0.18	0.21	
Tarsus	0.31	0.30	0.26	0.26	
Total	**1.83**	**1.56**	**1.17**	**1.42**	

***Crassignatha yinzhi* sp. n.**

Male

	I	II	III	IV	
Femur	0.51	0.39	0.29	0.40	
Patella	0.16	0.15	0.12	0.13	
Tibia	0.39	0.30	0.20	0.27	
Metatarsus	0.24	0.18	0.15	0.17	
Tarsus	0.20	0.25	0.24	0.22	
Total	**1.50**	**1.27**	**1.00**	**1.18**	

Female

	I	II	III	IV	
Femur	0.67	0.52	0.36	0.50	
Patella	0.18	0.17	0.13	0.15	
Tibia	0.49	0.37	0.24	0.34	
Metatarsus	0.39	0.23	0.19	0.21	
Tarsus	0.32	0.31	0.23	0.28	
Total	**2.04**	**1.60**	**1.15**	**1.48**	

***Crassignatha quanqu* sp. n.**

Male

	I	II	III	IV	
Femur	0.37	0.30	0.24	0.31	
Patella	0.13	0.12	0.11	0.10	
Tibia	0.29	0.22	0.16	0.21	
Metatarsus	0.18	0.15	0.12	0.13	
Tarsus	0.23	0.22	0.19	0.19	
Total	**1.19**	**1.01**	**0.81**	**0.94**	

Female

	I	II	III	IV	
Femur	0.50	0.41	0.30	0.42	
Patella	0.15	0.14	0.12	0.12	
Tibia	0.36	0.29	0.20	0.29	
Metatarsus	0.24	0.20	0.17	0.19	
Tarsus	0.26	0.25	0.23	0.24	
Total	**1.50**	**1.28**	**1.01**	**1.26**	

***Crassignatha yamu* sp. n.**

Male

	I	II	III	IV	
Femur	0.40	0.33	0.24	0.31	
Patella	0.13	0.13	0.09	0.11	
Tibia	0.30	0.24	0.16	0.21	
Metatarsus	0.18	0.15	0.12	0.14	
Tarsus	0.23	0.22	0.18	0.19	
Total	**1.23**	**1.07**	**0.79**	**0.96**	

Female

	I	II	III	IV	
Femur	0.45	0.40	0.30	0.39	
Patella	0.15	0.14	0.12	0.13	
Tibia	0.33	0.27	0.19	0.25	
Metatarsus	0.21	0.18	0.15	0.18	
Tarsus	0.26	0.25	0.22	0.21	
Total	**1.39**	**1.24**	**0.97**	**1.15**	

***Crassignatha ertou* sp. n.**

Male

	I	II	III	IV	
Femur	0.42	0.35	0.26	0.34	
Patella	0.14	0.12	0.10	0.12	
Tibia	0.33	0.26	0.18	0.24	
Metatarsus	0.18	0.17	0.14	0.16	

Tarsus	0.23	0.24	0.21	0.19	
Total	**1.30**	**1.14**	**0.88**	**1.04**	
			Female		
	I	II	III	IV	
Femur	0.45	0.38	0.26	0.36	
Patella	0.15	0.14	0.12	0.12	
Tibia	0.33	0.27	0.17	0.25	
Metatarsus	0.19	0.17	0.14	0.15	
Tarsus	0.25	0.23	0.21	0.21	
Total	**1.35**	**1.18**	**0.88**	**1.08**	

***Crassignatha gudu* sp. n.**

			Female		
	I	II	III	IV	
Femur	0.41	0.34	0.25	0.34	
Patella	0.14	0.13	0.11	0.12	
Tibia	0.29	0.24	0.17	0.23	
Metatarsus	0.20	0.17	0.15	0.15	
Tarsus	0.22	0.22	0.19	0.21	
Total	**1.25**	**1.09**	**0.87**	**1.05**	

***Crassignatha longtou* sp. n.**

			Female		
	I	II	III	IV	
Femur	0.39	0.38	0.23	0.32	
Patella	0.13	0.12	0.10	0.12	
Tibia	0.29	0.28	0.18	0.24	
Metatarsus	0.19	0.16	0.14	0.16	
Tarsus	0.22	0.21	0.19	0.20	
Total	**1.22**	**1.15**	**0.84**	**1.03**	

Appendix B.

Locality data (XLS format) for all specimens of the spider families Theridiosomatidae, Mysmenidae, Anapidae, and Symphytognathidae collected during an inventory of the Gaoligongshan, Yunnan, China, 1998-2007. File format: Microsoft Excel (1997-2003). doi: 10.3897/zookeys.11.160-app.B.dt.

Note: The spreadsheet contains three worksheets: MatExePub, kml, and IndexPic. **MatExePub** is the main page, containing taxonomic and collection locality information, as well as LSID and DOI information. **Kml** organizes data from MatExePub so it can be converted into a file that can be read by GoogleEarth (see instructions in comment, cell A1). **IndexPic** contains links to the image collections on Morphbank for each species; this information is linked to the MatExePub worksheet.

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Appendix C.

Locality data (KML format) for all specimens of the spider families Theridiosomatidae, Mysmenidae, Anapidae, and Symphytognathidae collected during an inventory of the Gaoligongshan, Yunnan, China, 1998-2007. File format: KML (Keyhole Markup Language) version 2.1 for GoogleEarth. doi: 10.3897/zookeys.11.160-app.C.dt.

Note: The KML file can be opened using GoogleEarth (http://earth.google.com/) to display an interactive map showing the distribution of all species treated in this publication. Click on placemarks to reveal specimen data and a hyperlink to a collection of images for each species posted on Morphbank (http://www.morphbank.net/). A hierarchical menu allows users to display or hide any family, genus, or species.

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Citations of the datasets:

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